

QK

139

.N4

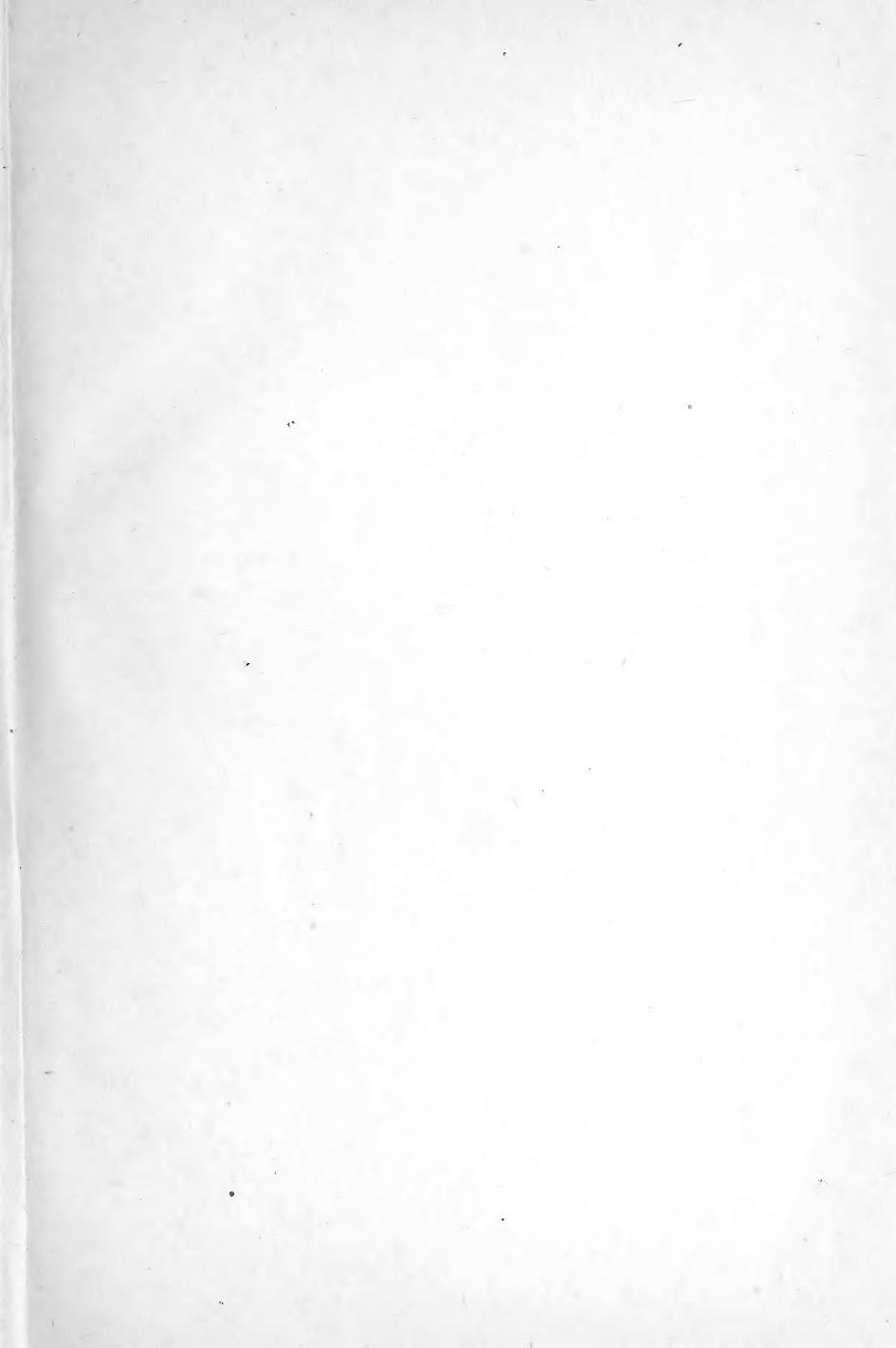


Class Q K 139

Book . N 4

Copyright N^o

COPYRIGHT DEPOSIT.





TWENTIETH CENTURY TEXT-BOOKS.

EDITED BY

A. F. NIGHTINGALE, Ph. D., LL. D.

FORMERLY SUPERINTENDENT OF HIGH SCHOOLS, CHICAGO



TWENTIETH CENTURY TEXT-BOOKS

AN
ANALYTICAL KEY

TO SOME OF THE
COMMON FLOWERING PLANTS OF
THE ROCKY MOUNTAIN REGION

BY

AVEN NELSON, A. M.

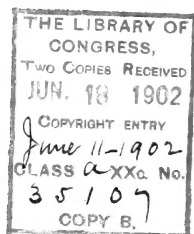
PROFESSOR OF BOTANY IN THE UNIVERSITY OF WYOMING



NEW YORK

D. APPLETON AND COMPANY

1902



COPYRIGHT, 1902
By D. APPLETON AND COMPANY

Published June, 1902

QK137
.H4

PREFACE

THERE are approximately 3,000 species of indigenous flowering plants in that portion of the United States known as the Rocky Mountain region. Many of these by reason of their abundance, attractiveness, and conspicuous characters afford material both suitable and available for use in the introductory courses in botany in high schools and colleges.

In spite of the fact that botany to-day must take cognizance of several new phases of the subject, it must still be admitted that a certain amount of work in systematic botany offers a point of contact with Nature that is of inestimable value. But justice to the co-ordinate and equally important divisions of the subject requires that systematic botany should take no more than a co-ordinate place.

For various reasons it has been found inexpedient in many instances to attempt the use of the standard manuals. It is hoped that this brief synoptical *Key* may meet the needs of such courses, and that the beginner, discovering for himself the names of a few of the common plants of his neighborhood, may develop an interest in his flora that will later make him, in some cases, a critical student of it.

This booklet is not offered as a substitute for a manual of the region, but rather as an introduction, which will prepare the student for the better use of a manual. It seems best, therefore, to include only the commoner species, and especially those that blossom during the spring and early summer. To select a

few hundred that should give a considerable range of choice to the many schools of this vast intermountain country has been no easy matter. If it has been successfully done, much of the credit is due to the following persons, who have kindly supplied lists of plants that it seemed to them well to include: Mr. George E. Osterhout, New Windsor, Col.; Prof. Eugene Beardsley, Colorado State Normal School; Prof. Francis Ramaley, University of Colorado; Prof. Ellsworth Bethel, Denver High School; Mr. H. L. Shantz, Colorado College; to each of whom the author's thanks are due. By this co-operation it is thought that a list has been secured that will prove useful from Montana to New Mexico, and with a somewhat variable eastward and westward extension. In spite of the care that has been exercised, some species that would be particularly available in some localities have no doubt been omitted. It will be greatly appreciated if teachers will report such species so that they may be included in subsequent editions.

To secure the best results from the use of this *Key* in the classroom, the teacher must keep in mind the following things: (1) That the number of species included is limited. Therefore it would be very unwise to permit students to attempt to name a miscellaneous collection of plants by means of it—a practice that would surely result in confusion and discouragement. Much better lay before the class material of such species only as are known to be included. These will furnish the discipline sought, with the added enthusiasm that comes from something actually accomplished. (2) That the descriptions are brief, no attempt having been made to distinguish a given species from all other species in that genus, but only from the other species in this *Key*. To do even this it will sometimes be necessary to keep in mind that the analytical keys are an essential part of the description, since the statements in the keys are not usually repeated. (3) That while the aim has been to avoid as far as possible strictly technical terms, yet conciseness has necessi-

tated the use of many ; therefore, one or more dictionaries, or manuals containing glossaries, ought to be always at hand.

(4) That it is always well to have one or more copies of the standard manuals at hand for reference (Coulter's is the only one out at present devoted to this region in particular, though many of our species will be found in Gray's and in Britton's).

Lastly, I wish to acknowledge my indebtedness to the first in this series of *Keys*, viz., that prepared by Dr. Coulter for the Eastern United States. In so far as the species used are the same for the two regions, I have taken the liberty of adopting not only the same mode of treatment, but in many instances the descriptions in their entirety. I am further deeply indebted in many ways to Dr. Britton's recent *Manual* and to Dr. Coulter's *Manual of the Rocky Mountains*.

AVEN NELSON.

UNIVERSITY OF WYOMING,
LARAMIE, *March, 1902.*

KEY TO THE FAMILIES

CLASS I. GYMNOSPERMS

Ovules naked upon a scale or bract (not inclosed in an ovary).

Resinous trees or shrubs with evergreen leaves **Pinaceæ** 5

CLASS II. ANGIOSPERMS

Ovules inclosed in an ovary.

SUB-CLASS (I) MONOCOTYLEDONS

Parts of the flower usually in threes (never in fives); leaves mostly parallel-veined; ours all herbs.

1. *Flowers usually with neither calyx nor corolla and massed upon a more or less fleshy axis (spadix)*

Marsh or aquatic plants, with linear leaves.

Flowers in a dense cylindrical terminal spike **Typhaceæ** 7

Flowers in globular heads **Sparganiaceæ** 7

2. *Flowers with calyx and corolla alike (perianth) or different, not collected upon a spadix*

a. Ovary superior (appearing within the flower)

Pistils numerous **Alismaceæ** 7

Pistil one.

Perianth of similar divisions or lobes.

Style 3; fruit a capsule **Melanthaceæ** 8

Style 1; fruit a capsule **Liliaceæ** 9

Style 1; fruit a berry **Convallariaceæ** 11

Perianth of 3 green sepals and 3 colored petals **Commelinaceæ** 8

b. Ovary inferior (appearing below the flower)

Stamens 3 **Iridaceæ** 12

Stamens 1 or 2 and massed with the style; flowers irregular **Orchidaceæ** 12

SUB-CLASS (II) DICOTYLEDONS

Parts of the flower usually in fives or fours; leaves mostly net-veined.

A. ARCHICHLAMYDEÆ

Corolla either wanting (*apetalous*) or of separate petals (*polypetalous*).

1. *Corolla wanting, and sometimes the calyx also* (naked)a. *Flowers in aments* (dense scaly spikes); *trees, shrubs or vines*

Calyx wanting.

A single flower in the axil of each bract; fruit a pod with numerous downy-tufted seeds **Salicaceæ** 14

Pistillate flowers 2 or 3 in the axil of each bract; fruit a winged or wingless nut **Betulaceæ** 15

Calyx present.

Fruit a nut inclosed by a cup or involucre **Fagaceæ** 16

Fruit an achene; twining vines **Moraceæ** 17

b. *Flowers not in aments** *Shrubs or trees*

Leaves opposite, palmately lobed; fruit in pairs and winged . . **Aceraceæ** 47

Leaves alternate, simple.

Fruit winged all around **Ulmaceæ** 17

Fruit berry-like **Eleagnaceæ** 52

* * *Herbs; sepals sometimes petal-like*

Pistils more than one, separate or nearly so **Ranunculaceæ** 23

Pistil one; ovary superior.

Ovary 5-celled and 5-beaked **Crassulaceæ** 32

Ovary 3-celled, becoming a 3-lobed capsule **Euphorbiaceæ** 46

Ovary 2-celled, becoming an emarginate capsule **Scrophulariaceæ** 73

Ovary 1-celled, becoming an achene **Polygonaceæ** 18

Pistil one; ovary inferior.

Leaves alternate; fruit dry, nut-like **Santalaceæ** 17

Leaves opposite; fruit inclosed by the calyx **Nyctaginaceæ** 20

2. *Calyx and corolla both present, the latter of separate petals*
(*polypetalous*)a. *Stamens more than 10*

Trees, shrubs, or woody vines; leaves alternate.

Pistils numerous, leaves with stipules **Rosaceæ** 35

Pistil one; fruit fleshy.

Ovary 1-celled; fruit a drupe (stone fruit) **Drupaceæ** 40

Ovary 5-celled; fruit a pome (calyx fleshy). **Pomaceæ** 39

Herbs.

Pistils several.

Stamens on receptacle **Ranunculaceæ** 23

Stamens on the calyx **Rosaceæ** 35

Pistil one.

Stamens separate.

Sepals 2 **Papaveraceæ** 27

Sepals 4 **Capparidaceæ** 31

Sepals numerous **Cactaceæ** 51

Calyx 5-lobed **Loasaceæ** 50

Stamens united into a column **Malvaceæ** 48

b. *Stamens not more than 10*

Trees, shrubs, or woody vines ; fruit fleshy.

Fruit a drupe (stone fruit) **Cornaceæ** 57

Fruit a berry.

Stamens alternate with petals **Grossulariaceæ** 34

Stamens opposite petals.

Stamens 4 or 5 ; climbing by tendrils **Vitaceæ** 48Stamens 6 ; not climbing **Berberidaceæ** 27

Herbs.

Pistils more than one **Crassulaceæ** 32

Pistil one.

Ovary 1-celled.

Corolla regular or nearly so.

Sepals 4 ; leaves compound **Capparidaceæ** 31Sepals 4 or 5 ; leaves simple **Caryophyllaceæ** 21Sepals 2 ; leaves fleshy **Portulacaceæ** 20

Corolla irregular.

Stamens 6, in 2 sets **Papaveraceæ** 27Stamens 5 ; one petal spurred **Violaceæ** 49Stamens 5 or 10 ; petals not spurred **Papilionaceæ** 40

Ovary 2- or 5-celled.

Ovary superior (appearing within the flower).

Ovary 2-celled.

Stamens tetradynamous, petals 4 **Cruciferae** 28Stamens 10, petals 5 **Saxifragaceæ** 32

Ovary 5-celled.

Leaves simple, flowers regular.

Anthers opening by holes at the apex **Pyrolaceæ** 57

Anthers opening lengthwise.

Leaves broad, lobed or toothed **Geraniaceæ** 46Leaves narrow, entire **Linaceæ** 46Leaves trifoliate **Oxalidaceæ** 47

Ovary inferior (appearing below the flower).

Fruit a 4-celled pod **Onagraceæ** 52Fruit splitting into 1-seeded halves **Umbelliferae** 55

B. SYMPETALÆ

Corolla with petals united (*sympetalous*), at least at base, or rarely wanting.1. *Stamens more numerous than the lobes of the corolla*

Ovary 1-celled.

Sepals 5 **Papilionaceæ** 40Sepals 2 **Papaveraceæ** 27

Ovary 3 to many-celled.

Stamens separate, style 1 ; fruit a berry.

Ovary superior **Ericaceæ** 58Ovary inferior **Vacciniaceæ** 58Stamens united into a column **Malvaceæ** 48

2. *Stamens as many as the lobes of the corolla or fewer*Stamens opposite the corolla-lobes **Primulaceæ** 59

Stamens alternate with the corolla-lobes, or fewer.

a. *Ovary superior* (appearing within the flower)

Corolla regular or nearly so.

Stamens as many as the corolla-lobes.

Ovaries 2, becoming a pair of follicles.

Pollen powdery **Apocynaceæ** 61Pollen in 2 solid waxy masses **Asclepiadaceæ** 62

Ovary 1.

Ovary deeply 4-lobed around the style.

Leaves alternate **Boraginaceæ** 66Leaves opposite **Labiataë** 69

Ovary not lobed, 1-celled.

Corolla scarious and veinless; leaves entire **Plantaginaceæ** 78Corolla not scarious; leaves not entire **Hydrophyllaceæ** 65

Ovary 2- to 10-celled; stamens on the corolla-tube.

Stamens 4.

Pod opening by a lid **Plantaginaceæ** 78Pod not opening by a lid **Verbenaceæ** 68

Stamens 5.

Fruit of 2 or 4 seed-like nutlets **Boraginaceæ** 66Fruit a many-seeded berry **Solanaceæ** 71

Fruit a many-seeded capsule.

Style short or none; stigma of two lamellæ **Gentiana** 60Style slender; stigma entire **Scrophulariaceæ** 73

Fruit a few-seeded capsule.

Style 1, 3-cleft **Polemoniaceæ** 63Styles 1 or 2, entire or 2-cleft **Convolvulaceæ** 62

Stamens fewer than the corolla-lobes.

Stamens 4 **Verbenaceæ** 68

Stamens 2.

Stems naked **Plantaginaceæ** 78Stems leafy **Scrophulariaceæ** 73

Corolla irregular, or rarely wanting.

Ovules and seeds solitary in the cells.

Ovary 4-lobed **Labiataë** 69Ovary not lobed **Verbenaceæ** 68Ovules and seeds 2 or more in each cell **Scrophulariaceæ** 73b. *Ovary inferior* (appearing below the flower)

Flowers not in an involucrate head.

Leaves alternate **Campanulaceæ** 81

Leaves opposite.

Stamens 4 or 5; fruit berry-like **Caprifoliaceæ** 78Stamens 3; fruit dry, 1-seeded **Valerianaceæ** 80

Flowers in an involucrate head.

All the flowers with strap-shaped corollas **Cichoriaceæ** 81All but the ray flowers with tubular corollas **Compositæ** 83

KEY TO THE SPECIES

I. PINACEÆ (PINE FAMILY)

Trees or sometimes shrubs, evergreen, more or less resinous; leaves needle-shaped or scale-like; staminate and pistillate flowers on the same individual (except in *Juniperus*); the male clusters of an indefinite number of stamens only; the female of few to many scales which become in fruit a dry cone, with 2 or more ovules at or on the base of each scale. In *Juniperus* the fruit is small, semi-fleshy, and berry-like. (See *Plant Structures*, Conifers, p. 191.)

* Fruits becoming dry cones.

1. **Pinus**. Leaves in bundles of 2-5.

2. **Picea**. Leaves single, sharp-pointed.

3. **Pseudotsuga**. Leaves single, blunt-pointed.

** Fruits semi-fleshy, berry-like.

4. **Juniperus**. Leaves scale-like or awl-shaped.

1. PINUS (PINE)

Trees; leaves of two kinds, the primary ones early deciduous, the secondary (ordinary foliage) slender, needle-shaped, in bundles of 2-5, united at the base by a sheath formed from the bud-scales; cones large, the scales becoming thick and woody and bearing 2 seeds on the base of each scale, not maturing till the second year.

* Leaves 2 in each bundle.

+ Scales tipped with delicate recurved prickles; seeds winged.

1. **Pinus Murrayana** "Oreg. Com." (LODGEPOLE PINE). Usually growing in dense groves or forests and then tall (15-30 m.) and very slender, nearly devoid of branches except at the summit; if growing in more open ground, more freely branched and stockier; leaves semi-terete, rather rigid, about 5 cm. long; cones small, adhering tenaciously to the branches, which are often marked by the dead, persistent cones of the previous years; scales closely compacted, with quadrangular ends. Common; preferring moist ground.

+ Scales without prickles; seeds wingless.

2. **Pinus edulis** Engelm. (PINON or NUT PINE). A low round-topped tree, freely branched, often from the base; leaves paired (rarely in threes), 3-4 cm. long, rigid; cones of few scales, sub-spherical; scale with thickened pyramidal tips; seeds edible.

** Leaves 3 in each bundle.

3. ***Pinus scopulorum*** (Engelm.) Lemmon (ROCK PINE). A large tree, 25-40 m. high, 1-2 m. in diameter; leaves 12-16 cm. long, mostly 3 in each bundle (rarely only 2), in dense brush-like bunches at the ends of the branches; cone 7-10 cm. long; scales thickened at the tip, which bears a sharp, recurved prickly.

* * * Leaves 5 in each bundle.

4. ***Pinus flexilis*** James (LIMBER PINE). A tree of wind-swept hills and summits, scattering, often much distorted; branches very flexible; leaves 4-7 cm. long; cones light colored, 8-10 cm. long, egg-shaped; scales with broad, slightly thickened tips, widely spreading when mature.

2. **PICEA** (SPRUCE)

Spire-shaped trees, often tall and slender; leaves spirally arranged, jointed near the base, falling when dry and leaving the branchlets rough with the projecting bases; cones pendulous, oblong, of numerous scales bearing two ovules.

* Branchlets pubescent; leaves abruptly sharp-pointed.

1. ***Picea Engelmanni*** Engelm. (ENGELMANN SPRUCE). A large tree of the higher mountains, forming dense forests; on alpine summits depressed and matted; leaves keeled, 2-3 cm. long; cones solitary, oblong, about 5 cm. long.

* Branchlets smooth and shining; leaves needle-pointed.

2. ***Picea Parryana*** (Andre.) Parry (BLUE SPRUCE). A small, conical tree with soft wood, and smooth bark when young; leaves slender, sharply 4-angled, usually bluish-green; cones narrowly oblong, 5-10 cm. long, drooping, generally in clusters, and numerous crowded at the summit of the tree. This tree prefers moist situations. It is extensively used for ornamental planting, for which its beautiful color and handsome outline admirably fit it. As the chosen "State Tree" of Colorado it is of interest.

3. **PSEUDOTSUGA** (FALSE HEMLOCK-SPRUCE)

A large, stately tree, occurring in the mountains at middle elevations, on moist slopes and plateaus; leaves with a short petiole, twisting on the base so as to appear comb-like on the branches, which are smooth when the leaves have fallen and marked only by oval scars.

1. ***Pseudotsuga taxifolia*** (Lam.) Britt. (DOUGLAS SPRUCE). Often 35-50 m. high; bark thick and furrowed; leaves flattened, blunt pointed, whitish below, 2 cm. or more in length; cones oval, 7-9 cm. long, perfectly characterized by the fringe-like, somewhat reflexed, 3-pointed bracts which project from among the scales of the cone.

4. **JUNIPERUS** (JUNIPER)

* Leaves short, blunt and scale-like (except in seedlings).

1. ***Juniperus scopulorum*** Sargent (ROCKY MOUNTAIN JUNIPER). Becoming a low, round-topped tree with thick trunk, or sometimes freely branched from the base (rarely, in very exposed situations, a mere shrub); leaves in pairs, very short, nearly clothing the branchlets; berries very numerous, not maturing till the second season, light green when young, when mature blue with whitish bloom.

* * Leaves awl-shaped, prickly-pointed, 10-15 mm. long.

2. *Juniperus Sibirica* Burgsd. (DWARF JUNIPER). A low-spreading shrub, rarely 1 m. high, forming dense, usually circular patches; leaves in 3s, crowded, rigid, channeled, and often whitish above; berries small, fleshy, bluish, 1-3-seeded. Rocky hillsides.

II. TYPHACEÆ (CAT-TAIL FAMILY)

Plants of marshes and shallow ponds, with stout rootstocks and fibrous roots; stems round and stout, with flat, striate, linear leaves; staminate and pistillate flowers on same plant in a dense terminal spike; ovary 1-celled, becoming a 1-seeded nut-like fruit.

1. TYPHA (CAT-TAIL)

Tall herbs with large grass-like leaves sheathing the base of the simple stem, which is terminated by a long and very dense cylindrical spike of flowers, the upper part staminate and wilting, the lower part pistillate, more compact and persistent.

1. *Typha latifolia* Linn. (BROAD-LEAVED CAT-TAIL). Stem 1-2 m. high, surpassed by the broad (15-30 mm.) leaves; staminate and pistillate parts of the spike contiguous. (See *Plant Structures*, p. 239, Fig. 221.) Very abundant in ponds and on the marshy banks of streams.

III. SPARGANIACEÆ (BUR-REED FAMILY)

The characters of the family are nearly those of *Typhaceæ*, except that the flowers and fruits are in dense globular heads which are subtended by leaf-like spathes.

1. SPARGANIUM

Leaves broadly linear, flat, sheathing the stems at the base; the upper heads small, of stamens only; the lower large, of numerous pistils.

1. *Sparganium eurycarpum* Engelm. (BUR-REED). Stems branched above, 8-15 dm. high; fertile heads 2 cm. or more in diameter; fruits sessile, angled, with flattened or depressed summit; scales several from the base of each nutlet. Borders of ponds and sluggish streams.

IV. ALISMACEÆ (WATER-PLANTAIN FAMILY)

Marsh plants with naked stems, sheathed at the base by the petioles of the broad leaves; sepals and petals each 3; stamens 6 or more; pistils many.

1. *Alisma*. Stamens 6; carpels in a single ring on a flat receptacle.

2. *Sagittaria*. Stamens many; carpels in a dense head.

1. **ALISMA** (WATER PLANTAIN)

Marsh herbs, the naked stems freely branched above; leaves long-petioled, nerved, ovate or oblong, with rounded base; the small flowers in loose clusters.

1. *Alisma Plantago-aquatica* L. (WATER PLANTAIN). Stem 3-7 dm. high, branching above to form the long, open panicle of flowers; leaves 5-9-nerved, with fine cross-veins; flowers perfect; fruit obliquely obovate, keeled on the back. Spring bogs, etc.

2. **SAGITTARIA** (ARROW-HEAD)

Flowers monœcious, borne in whorls of 3s, the staminate uppermost, the pistillate numerous.

1. *Sagittaria arifolia* Nutt. (ARROW-HEAD). Growing in shallow ponds or in stream margins; leaves sagittate, with broad blade, the apex acute, the basal lobes lanceolate, becoming acuminate; petioles and scape weak; bracts as long as the pedicels; petals white, conspicuous; akene obovate, winged, the very short beak erect.

V. **COMMELINACEÆ** (SPIDERWORT FAMILY)

Perennial herbs, with jointed, leafy stems; leaves linear, channeled and sheathing at base; perianth free, of 3 green sepals and 3 blue ephemeral petals; stamens 6; a single style; and a 2- or 3-celled ovary becoming a pod.

1. **TRADESCANTIA** (SPIDERWORT)

Low herbs, with nearly simple stems; leaves narrow; flowers in terminal umbels; stamens densely blue-bearded.

1. *Tradescantia scopulorum* Rose (CLIFF SPIDERWORT). Stems slender, 2-3 dm. high, sparingly branched, light green and nearly smooth; leaves numerous, linear, mostly radical, the involucrel ones short, unequal, and filiform; umbels several; flowers pale blue.

VI. **MELANTHACEÆ** (BUNCH-FLOWER FAMILY)

Leafy-stemmed herbs with bulbs (in ours); leaves broadly linear, alternate; perianth as in the *Liliaceæ*; stamens 6, free; fruit a 3-celled capsule.

1. **ZYGADENUS** (CAMASS)

Erect perennials from onion-like bulbs; flowers in racemes, the greenish-white or yellowish segments with a gland near the base; capsule 3-lobed, splitting to the base at maturity.

1. *Zygadenus elegans* Pursh (LARGE-FLOWERED CAMASS). Stem 4-8 dm. high; leaves glaucous, keeled, 1-2 cm. broad; flowers greenish-white, the segments obovate, 7-10 mm. long, with an obcordate gland near the base; capsule oblong, longer than the flower segments. In wet valleys.

2. *Zygadenus falcatus* Rydb. Stem stoutish, 3-4 dm. high; leaves somewhat scabrous, shorter than the stem, usually conduplicate and falcate; flowers yellowish-white, the segments 5 mm. long, ovate, short-clawed; gland semi-orbicular; capsule ovoid-cylindrical.

VII. LILIACEÆ (LILY FAMILY)

Herbs; stems scapose or leafy, from bulbs or fleshy roots (a woody caudex in *Yucca*); leaves mostly linear; flowers perfect; perianth of 6 distinct segments; stamens 6, on the receptacle or the tube of the perianth; styles united; stigma 3-lobed or entire; ovary 3-celled, becoming a capsule. (See *Plant Structures*, p. 245.)

* With fleshy roots from a short rootstock.

1. *Leucocrinum*. Perianth white, with long narrow tube.

* * Bulbous plants.

+ Flowers in umbels.

2. *Allium*. Umbel of flowers from a 1- or 2-leaved scarious sheath; onion scented.

+ + Flowers solitary, racemed or sub-umbellate.

++ Perianth segments all alike.

3. *Lilium*. Perianth large, erect, funnel-form, orange-red.

4. *Fritillaria*. Perianth nodding, small, reddish-brown, segments not reflexed.

5. *Erythronium*. Perianth nodding, yellow, segments reflexed.

++ ++ Outer perianth segments narrower than the inner.

6. *Calochortus*. Flowers erect, outer segments small, the inner with a hairy gland at base.

* * * With large woody caudex.

7. *Yucca*. Leaves rigid, sharp-pointed, numerous.

1. LEUCOCRINUM

Stemless, the numerous fleshy roots from a short rootstock which bears the several linear leaves; flowers few to many from the crown of the rootstock.

1. *Leucocrinum montanum* Nutt. (WHITE MOUNTAIN LILY). Leaves thick, surrounded at base by scarious bracts; flowers white, the tube slender, 3-5 cm. long, the segments spreading; stamens on the tube; style long, with dilated stigma. The fragrant blossoms appear just above the ground in early spring.

2. **ALLIUM** (ONION)

Strong-scented herbs, with coated bulb and a basal cluster of leaves; stem naked, bearing a terminal umbel of small flowers; perianth of distinct (or nearly so) divisions and a 3-lobed pod.

1. **Allium cernuum** Roth. (NODDING WILD ONION). Stems slender, from deep-seated, clustered bulbs with long necks, 2-4 dm. high; leaves flat, 2-4 mm. wide; umbel nodding; pedicels slender, long; flowers rose-tinted. Occasional; in the valleys among the foothills.

2. **Allium reticulatum** Don. (WILD ONION). Bulb rather large, the coats strikingly fibrous-reticulate; stem 1-2 dm. high; leaves narrow, channeled; the flowers white or pinkish, on short pedicels, each bearing two crests. In sandy soil of plains and valleys.

3. **LILIUM** (LILY)

Bulbs of thick scales; stems simple, with scattered or whorled leaves, flowers 1-several, large, showy, erect or drooping, funnel-form or bell-shaped; stamens and style long; anthers versatile.

1. **Lilium montanum** Aven Nelson (MOUNTAIN LILY. "TIGER LILY"). Bulb depressed-globose, of thick fleshy scales; stem 3-4 dm. high; leaves smooth, dark green, alternate except the uppermost whorl of 5-7, lanceolate, sessile; the segments of the single erect flower elliptic-oblong, tapering to both ends, brownish-red to orange-red, the base of the inner face dotted with purplish-black spots; stamens and stigma purplish; capsule oblong-cylindric. In moist thickets near mountain streams.

4. **FRITILLARIA**

Much like *Lilium*; flowers small, bell-shaped, nodding, leafy-bracted; anthers not versatile.

1. **Fritillaria atropurpurea** Nutt. (PURPLE FRITILLARIA). Bulbs from thick, nearly rice-shaped scales; stems 1-2 dm. high; leaves scattered or whorled; flowers 1-4, dull-purple and mottled; stamens shorter than the narrowly oblong perianth segments; capsule erect, obovate, acutely angled.

5. **ERYTHRONIUM** (DOG-TOOTH VIOLET)

Herbs from deep-set bulbs; leaves only 2, smooth, flat, shining, sheathing the base of the naked stem; flowers 1 or more, nodding; perianth of six separate and recurved segments.

1. **Erythronium parviflorum** (Wats.) L. N. Goodding (COLORADO DOG-TOOTH VIOLET). Bulb slender, 3-5 cm. long; scape slender; leaves oblong, tapering to both ends; flowers usually only 1, nodding, bright yellow, the segments 2-3 cm. long; capsule oblong to oval, 2-3 cm. long. Moist slopes in the mountains.

6. **CALOCHORTUS** (MARIPOSA LILY)

Herbs from coated corms; stems slender, branching; leaves linear; flowers few, showy, open campanulate, the 3 outer segments green and sepal-like, the 3 inner petaloid, with densely hairy glands; capsule oblong, obtusely angled.

* Anthers obtuse.

1. **Calochortus Nuttallii** T. & G. (NUTTALL'S MARIPOSA LILY). Stem 2-4 dm. high; leaves few; flowers 1-5; the outer perianth segments lanceolate, shorter than the inner; the inner obovate-cuneate, white or lilac, with a purple spot above the yellow base, densely hairy around the circular gland; filaments as long as the sagittate anthers; capsule acuminate. Moist or dry ground, in the mountains.

* * Anthers acute.

2. **Calochortus Gunnisoni** Wats. (GUNNISON'S MARIPOSA LILY). Very similar but usually smaller; outer perianth segments scarious margined, inner white or lilac with a yellow base; gland transverse, oblong or reniform, hairy; capsule narrowed at both ends. Mostly in dry ground, in the mountains.

7. YUCCA

Leaves crowded on the short, thick, woody rootstock, linear, rigid, and dagger-pointed; flowers large, racemed on the thick scape-like stems, nodding, bell-shaped; stamens with thick filaments and small versatile anthers; ovary sessile; capsule large, incompletely 6-celled.

1. **Yucca glauca** Nutt. (SPANISH BAYONET. SOAP-WEED. BEAR-GRASS). Leaves with numerous thread-like filaments on the margin; flowers yellowish or greenish-white; segments thick, ovate, 2-3 cm. long; fruit erect, large, broadly oblong, somewhat 6-sided; seeds black and thin. Frequent on dry hillsides.

VIII. CONVALLARIACEÆ (LILY-OF-THE-VALLEY FAMILY)

Herbs with leafy or scapose stems, from true rootstocks; leaves broad, parallel-veined (in ours); perianth segments distinct or united; styles 1 or 3; fruit a fleshy berry.

* Flowers racemed.

1. **Vagnera**. Raceme terminal on a leafy stem.

* * Flowers solitary or two together.

2. **Disporum**. Peduncles straight.

3. **Streptopus**. Peduncles bent or twisted near the middle.

1. VAGNERA (FALSE SOLOMON'S SEAL)

Stems slender, 1-3 dm. high; leaves scale-like below; inflorescence a terminal raceme or panicle; flowers small, white or shading to green; perianth segments similar, spreading; anthers versatile; fruit a berry.

* Flowers in a raceme.

1. **Vagnera stellata** (L.) Morong (STAR-FLOWERED SOLOMON'S SEAL). Stem smooth, 1-4 dm. high; leaves smooth above, minutely pubescent below, oblong-lanceolate, sessile and somewhat clasping, 3-8 cm. long, usually folded on the midrib; filaments shorter than the perianth; berry at first green with dark stripes, becoming red when ripe. In moist woods and meadows.

* * Flowers paniced.

2. *Vagnera amplexicaulis* (Nutt.) Greene. Stems 4-8 dm. high; leaves ovate to broadly lanceolate, clasping at base; flowers in a small, close panicle; berry red. Not frequent; in moist rich woods.

2. DISPORUM

The branching stems from slender rootstocks; leaves alternate, clasping; flowers terminal, yellowish-white; perianth of 6 narrow deciduous segments; stigma 3-cleft; berry sub-globose.

Disporum trachycarpum (Wats.) B. & H. Leaves ovate or narrower, acute; perianth segments whitish, acute; fruit lobed and roughened. Shaded woody slopes.

3. STREPTOPUS

Stem stout, with forking and divergent branches; leaves ovate, acuminate, thin, clasping; flowers small, the peduncles slender and twisted near the middle.

1. *Streptopus amplexifolius* (L.) DC. Stems 6-10 dm. high; the thin smooth leaves glaucous below; peduncles 1-2-flowered; anthers tapering to a slender point; stigma entire, truncate; berry oval. In moist woods.

IX. IRIDACEÆ (IRIS FAMILY)

Perennial herbs; leaves linear, 2-ranked, equitant, sheathing; flowers perfect, the 6 perianth segments petal-like; stamens 3, with extrorse anthers; style 3-cleft at the apex; ovary inferior, 3-celled, becoming a triangular pod with many seeds.

1. IRIS (IRIS. FLAG)

Tall herbs from thick rootstocks, with sword-shaped leaves and large showy flowers; the perianth segments united below into a tube; the 3 outer ones (sepals) reflexed and larger than the 3 erect inner (petals); divisions of the style petal-like, arching over the 3 long stamens. (There are many handsome species in cultivation.)

1. *Iris Missouriensis* Nutt. (WESTERN BLUE FLAG). Stem slender, the leaves few, mostly basal, shorter than the stem; flowers 1-2, with scarious dilated bracts, light blue; parts of the flower 5-7 cm. long; capsule oblong, obtusely angled, 2-3 cm. long. Common on wet lands.

X. ORCHIDACEÆ (ORCHIS FAMILY)

Herbs with alternate leaves, very irregular and often showy flowers, 3 petal-like sepals, 3 petals (the lower one different from the others and called the lip), a central column composed of blended stamens and style, and an inferior 1-celled ovary

becoming a pod with innumerable very minute seeds. (See *Plant Structures*, p. 249, also Figs. 235-237; also *Plant Relations*, p. 127, Fig. 123, also Figs. 137-142.)

* With tufted fibrous roots.

1. **Cypripedium**. The lip a large inflated sac.

** With fascicled fleshy roots.

2. **Limnorchis**. Stem leafy; flower spike not twisted.

3. **Gyrostachys**. Stem leafy below only; flower spike twisted.

*** Bulb-bearing.

4. **Calypso**. Stem naked, a single basal leaf.

1. CYPRIPEDIUM (LADY-SLIPPER)

Herbs with large many-nerved leaves sheathing at base, solitary or few large and showy flowers, spreading sepals, usually narrow petals, lip a large inflated sac, and a declined column.

1. **Cypripedium parviflorum** Salisb. (SMALL LADY-SLIPPER). Stems 2-5 dm. high; leaves oval to lanceolate, 4-12 cm. long; sepals and petals longer than the bright yellow lip, which is marked with purple stripes or blotches, flattened from above, 2-3 cm. long. In bogs and damp woods. Rare.

2. LIMNORCHIS

Leafy plants, with fleshy roots; flowers white or greenish in a long spike; sepals and petals spreading, the lip entire; column short; glands naked.

1. **Limnorchis viridiflora** (Cham.) Rydb. (GREEN ORCHIS). Stem stout and leafy, 2-4 dm. high; leaves lanceolate, obtusish or acute; spike crowded, 6-12 cm. long; flowers small, greenish, the lip lanceolate; ovary more or less twisted. In bogs and wet woods.

3. GYROSTACHYS (LADY TRESSES)

Herbs, leafy below, from fleshy roots; flowers small, spirally 3-ranked; lip dilated, embracing the column, undulate or crisped at apex; capsule erect.

1. **Gyrostachys stricta** Rydb. (HOODED LADY TRESSES). Stems naked above, 1-3 dm. high; leaves smooth, narrowly oblanceolate or oblong; spike 5-10 cm. long; bracts shorter than the white fragrant flowers; oblong lip thin and veined.

4. CALYPSO

Low bulbous herb, with a single thin ovate leaf, a short naked stem bearing a large and showy (variegated purple, pink and yellow) flower, nearly similar spreading pointed sepals and petals, a sac-shaped inflated lip larger than the rest of the flower, and a broadly winged petal-like column.

Calypso bulbosa (L.) Oakes (CALYPSO). Bulb solid, with coralloid roots; the low scape sheathed by 2-3 loose scales; leaf ovate, subcordate; lip woolly-hairy inside. Moist spruce and pine woods.

XI. SALICACEÆ (WILLOW FAMILY)

Diœcious trees or shrubs, with alternate undivided leaves, flowers in aments and destitute of floral envelopes; stamens 2-30; ovary 1-celled; and fruit a pod containing numerous seeds with long silky down ("cotton"). (See *Plant Structures*, p. 255.)

1. **Salix.** Bracts of the ament entire; stamens few; buds with a single scale.
2. **Populus.** Bracts of the ament cut-lobed at apex; stamens numerous; buds scaly.

1. SALIX (WILLOW)

Trees or shrubs, generally growing along streams, with lithe branches and mostly with long pointed leaves; the staminate ament with 2-5 stamens to each bract; the pistillate ament with 1 slender pointed ovary to each bract, becoming a 2-valved capsule. (See *Plant Structures*, p. 219, Fig. 196, and p. 257, Fig. 240.)

* Stamens 2.

+ Leaves broadly linear; capsule glabrous at maturity.

1. **Salix fluviatilis** Nutt. (SANDBAR OR RIVER-BANK WILLOW). A shrub often in dense clumps, 1-3 m. high; the branches or young shoots very slender; leaves sparsely denticulate, pubescent only when young, 4-7 cm. long, 5-7 mm. wide; aments on short leafy branches; capsule ovoid-conic. Common on the banks of rivers and on the borders of the smaller streams.

+ + Leaves lanceolate or broader; capsule silky.

2. **Salix Nuttallii** Sargent (NUTTALL'S WILLOW). A slender shrub, often spreading from the root and forming dense clumps, 1-2 m. high; bark on young branchlets distinctly yellowish; leaves oblong to obovate, from acute to broadly obtuse, glabrous and dark green above, lighter and pubescent below; aments expanding in early spring before the leaves; capsule on a short pedicel, white-tomentose, tapering to a beak.

3. **Salix Bebbiana** Sargent (BEBB'S WILLOW). A shrub or small bushy tree, 2-5 m. high, not spreading from the root, though often branched from the base; leaves elliptic to lanceolate, acute, entire or nearly so, puberulent above, pale and tomentose beneath; aments expanding with the leaves; capsule long, taper-pointed, on a slender pedicel half as long as the capsule.

* * Stamens 3-5.

4. **Salix amygdaloides** Anders. (PEACH-LEAF WILLOW). Becoming a small tree; leaves lanceolate or broader, 5-9 cm. long, serrate, taper-pointed, pubescent when young only; aments appearing with the leaves; capsule ovoid, glabrous, becoming as long as the filiform pedicel.

2. POPULUS (COTTONWOOD. ASPEN)

Trees with leaves from lanceolate to broadly deltoid, the buds with resinous-aromatic scales; staminate flowers 1 to each bract, with 8-30 or more stamens; pistillate flowers also single in the axils of the bracts of the ament, with 2-4 elongated styles.

* Petiole flattened laterally; leaves broadly ovate or deltoid.

1. **Populus tremuloides** Michx. (ASPEN. AMERICAN ASPEN). A small tree, 6-20 m. high, usually in dense groves and rarely attaining the maximum size; bark smooth, greenish-white; leaves small, roundish heart-shaped, with a short sharp point and small regular teeth, smooth on both sides, with downy margins; petioles slender, flattened laterally, causing movement of the leaves in the lightest breeze; lobes of the bracts linear, silky; stamens 6-20; capsule conic. Very common on moist slopes and valleys in the hills and mountains.

2. **Populus deltoides** Marsh. (COTTONWOOD. NECKLACE POPLAR). The largest of the cottonwoods, 1 m. or more in diameter and 20-30 m. in height, with thick rough furrowed bark; branches angular; leaves large, broadly deltoid, sometimes heart-shaped, abruptly acuminate; scales lacerate; capsule ovate. On stream banks. (See *Plant Relations*, p. 70, Fig. 61.)

* * Petioles sub-terete; leaves lanceolate.

3. **Populus angustifolia** James (NARROW-LEAVED COTTONWOOD). Becoming a medium-sized tree, with rough furrowed bark, 10-20 m. high, rarely 1 m. in diameter; leaves mostly narrowly lanceolate, sometimes broader with rounded base, acute or obtusish at apex, finely crenulate the whole length; petioles not flattened laterally; branches terete; capsule ovoid. Usually forming groves on bottom lands.

4. **Populus acuminata** Rydb. (RYDBERG'S COTTONWOOD). A tall tree with smooth light-colored bark, taller and slenderer than the preceding; branches terete; leaves bright green, smooth, lanceolate or broader, long acuminate, rounded at base, crenulate, petioles slender; capsule ovoid, obtuse. From the Black Hills south through the Rocky Mountains. Largely planted as a shade-tree.

XII. BETULACEÆ (BIRCH FAMILY)

Trees or shrubs with alternate simple straight-veined leaves, staminate flowers in elongated aments, fertile flowers in long or short aments, 1-5 sepals or none, 2-8 stamens, and a 2-celled ovary becoming a nut (with or without wings).

1. **Betula**. Stamens 2; fruiting bracts 3-lobed, fruit winged.

2. **Alnus**. Stamens 4; fruiting bracts woody, fruit wingless.

3. **Corylus**. Stamens 8; nut large, bony, enclosed by a leafy involucre.

1. BETULA (BIRCH)

Trees or shrubs; bark usually separable in sheets, dotted on the branchlets; staminate aments long, bearing membranous flowers with 2 stamens; pistillate aments short, 2-3 flowers in the axil of each bract, the bracts deciduous with the fruit; nut small, scale-like, broadly winged. (See *Plant Relations*, p. 71, Fig. 62.)

* A small tree or tree-like shrub.

1. **Betula fontinalis** Sargent (ROCKY MOUNTAIN BIRCH). Ranging in size from a tree-like shrub to a tree 12 m. or more high, usually slender and freely branched; bark smooth, dark; branches gracefully drooping; leaves thin, broadly ovate, with small gland-tipped teeth; smooth above, lightly pubescent beneath; wings of the nutlet as broad as the body. On the banks of streams.

* A low shrub growing in clumps.

2. *Betula glandulosa* Michx. (MOUNTAIN-BOG BIRCH). A small shrub about 1 m. high, usually occurring in rather dense patches, the twigs glandular-warty; leaves small, glabrous, crenulate, sub-orbicular or obovate, dark green above, lighter and gland-dotted beneath; bracts 3-lobed; nut orbicular-winged. Common in wet sub-alpine parks.

2. ALNUS (ALDER)

Shrubs or small trees with flowers in terminal aments and developed before the leaves, elongated and drooping staminate aments (3 flowers to each bract, a 3-5 parted calyx and as many stamens), ovoid or oblong pistillate aments (2 or 3 flowers to each fleshy bract, calyx of 4 small scales, and a 2-celled ovary), and a wingless fruit. (See *Plant Structures*, p. 257, Fig. 241.)

1. *Alnus tenuifolia* Nutt. (PAPERLEAF ALDER). A large shrub or small tree, usually several-stemmed from the base; leaves ovate, with prominent veins, rather large, sharply double-toothed; aments begin their development the summer preceding the season in which they open and hang naked upon the branches during the winter, opening in the spring before the leaves develop; fertile aments erect, their scales becoming woody, persistent for a time after the small, compressed, scarcely winged nuts have fallen. The common Alder on all the streams of this region.

3. CORYLUS (HAZEL-NUT)

Shrubs with toothed leaves, staminate flowers in drooping cylindrical aments (consisting of 8 stamens), pistillate flowers from scaly buds, each in the axil of a bract, with a pair of lateral bracts which become enlarged in fruit, forming the elongated involucre cup or husk.

1. *Corylus rostrata* Ait. (BEAKED HAZEL-NUT). A small shrub, 1 m., more or less, in height, usually in clumps or small thickets; leaves ovate, acute, subcordate; the involucre bristly, much prolonged above the ovoid nut, forming a narrow tubular beak. Rare in this range.

XIII. FAGACEÆ (BEECH FAMILY)

Trees with alternate simple leaves, staminate flowers in slender aments or small heads, fertile flowers 1 or 2 inclosed in a small cup which becomes hard and more or less surrounds the nut, 4-8-lobed calyx, no petals, and 3-20 stamens.

1. QUERCUS (OAK)

Trees with alternate simple leaves, greenish or yellowish staminate flowers in slender aments (with 4-8-lobed calyx and 6-12 stamens), pistillate flowers scattered or somewhat clustered, a nearly 3-celled ovary inclosed by a scaly involucre, which becomes a hard cup around the base of the nut or acorn.

1. *Quercus Gambellii* Nutt. (GAMBELL'S WHITE OAK). A shrub 3-5 m. high; leaves obovate in outline, deeply lobed, green above, downy on lower surface; cup hemispheric; acorn ovoid, acute or obtusish.

XIV. ULMACEÆ (ELM FAMILY)

Trees with alternate serrate pinnately veined leaves, 4-9-cleft calyx, no petals, 4-9 stamens, 2 styles, and a 1-2-celled ovary becoming a winged or berry-like fruit.

1. *CELTIS* (HACKBERRY)

Small or large trees with pointed petioled leaves, greenish axillary flowers appearing with the leaves, and fruit fleshy, inclosing a stone (drupe).

1. *Celtis occidentalis* L. Leaves reticulate, heart-shaped, ovate, or lanceolate, taper-pointed, sharply serrate; fruit reddish or yellowish, becoming dark purple, as large as small cherries, sweet, edible. Woods and river banks. Rare in this range.

XV. MORACEÆ (MULBERRY FAMILY)

Trees, shrubs, or herbs (our only native genus an herbaceous vine); calyx 5-parted; petals none; stamens 5; ovary superior, 1-celled.

1. *HUMULUS* (HOP)

A rough twining vine, climbing to a height of several meters; leaves large, opposite, palmately veined, petioled and stipulate; flowers dioecious, the staminate panicle, the pistillate in clustered aments; bracts leafy, each 2-flowered; akene invested with the enlarged scale-like calyx.

1. *Humulus lupulus* L. (HOP). Leaves broadly ovate in outline, deeply 3-7-cleft; the ripe fruits (hops) 2-4 cm. long, sprinkled with yellow resinous grains, as is also the calyx.

XVI. SANTALACEÆ (SANDALWOOD FAMILY)

Herbs or shrubs; leaves alternate, without stipules; flowers perfect, the calyx 3-5-cleft and adherent to the ovary; stamens as many as the calyx lobes; fruit a nut-like drupe.

1. *COMANDRA* (COMANDRA)

Smooth perennial herbs, probably parasitic on the roots of other plants; leaves pinni-veined, alternate; flowers bractless, in terminal umbel-like cymes; calyx bell-shaped; fruit globose, surmounted by the persistent calyx.

1. *Comandra pallida* A. DC. (PALE COMANDRA). Erect, 1-2 dm. high, the stems arising from horizontal rootstocks; leaves pale and glaucous, linear to lanceolate or oblong; cymes corymbose, several-flowered; calyx greenish-white or purplish; fruit becoming dry and hard, 5-7 mm. in diameter. Abundant on sandy open or partly wooded slopes and in the draws.

XVII. **POLYGONACEÆ** (BUCKWHEAT FAMILY)

Herbs with alternate entire leaves, stipules in the form of sheaths above the swollen joints of the stem or wanting, 3-6-cleft calyx, no petals, 4-8 stamens, and a 1-celled ovary usually becoming a 3-angled nut-like fruit (achene).

* Ochrea none ; flowers subtended by involucre.

1. **Eriogonum**. Stamens 9 ; calyx 6-cleft or parted.

* * Ochrea present ; flowers not involucre.

2. **Rumex**. Stamens 6 ; calyx 6-parted.

3. **Polygonum**. Stamens 8 ; calyx 5-parted.

1. **ERIOGONUM**

Annual or perennial herbs or with shrubby base, with entire leaves, small flowers in umbellate or capitate clusters which are subtended by a 5-8-toothed or cleft involucre ; style 3-parted ; stigma capitate ; achene 3-angled.

* Flowers yellow ; involucre turbinate.

+ Achene angled (not winged).

1. **Eriogonum umbellatum** Torr. (SULPHUR FLOWER). Perennial, with scapose stems ; leaves smooth and green above, white-tomentose below, oblanceolate or spatulate ; bracts large and leaf-like ; umbel of 2-10 rays ; flowers glabrous, sulphur yellow. Abundant on hillsides and mountain foothills.

2. **Eriogonum subalpinum** Greene (SUB-ALPINE ERIOGONUM). Very similar to the above, but often larger, 3-5 dm. high ; the leaves more tomentose above, and the flowers a light yellow or creamy-white. In similar situations.

3. **Eriogonum flavum** Nutt. (YELLOW ERIOGONUM). Perennial, white-tomentose ; scape naked, about 2 dm. high ; leaves oblanceolate ; bracts rather large ; flowers bright yellow, very silky-pubescent ; filaments villous at base ; achene villous near the top. Cañons and foothills.

+ + Achene winged.

4. **Eriogonum alatum** Torr. (WINGED ERIOGONUM). An erect perennial, 5-10 dm. high, branched above, with a stiff pubescence ; leaves nearly linear, the midrib conspicuous below ; inflorescence an open panicle, the solitary involucre with five erect teeth ; flowers small, yellow ; achene 3-winged.

* * Flowers white, shading to pink or purple.

+ Annual.

5. **Eriogonum annuum** Nutt. (ANNUAL ERIOGONUM). White-tomentose ; stems mostly simple, leafy below, 3-6 dm. high ; leaves oblong or oblanceolate ; bracts small ; inflorescence a di- or trichotomous cyme ; calyx white, the outer segments broader than the inner, glabrous, as is also the achene. Common on the dry plains.

6. **Eriogonum cernuum** Nutt. (NODDING ERIOGONUM). Nearly glabrous ; leaves radical, oval to orbicular ; the slender naked stem branching diffusely and terminating in trichotomous cymes ; flowers white or rose-colored, on deflexed

pedicels, the outer sepals broader than the inner. Sandy slopes and plains; common.

+ + Perennial.

7. **Eriogonum ovalifolium** Nutt. (OVAL-LEAVED ERIOGONUM). Cespitose; leaves from the crowns of the much-branched caudex, from orbicular to ovate; bracts very small; involucre in a single close head; flowers yellow. This species is abundant in but few localities, but the following variety is very generally distributed.

Var. **purpureum** (Nutt.) Aven Nelson. Size and habit of the species; the flowers varying from white through pink to purple. Dry gravelly plains.

2. RUMEX (DOCK)

Coarse herbs often with large leaves, clusters of small mostly greenish flowers, calyx of 6 sepals (3 outer spreading in fruit, 3 inner larger and somewhat colored, enlarged after flowering, veiny, and closing over the nut-like fruit), 6 stamens, and 3 styles.

* Wings much enlarged, without tubercles.

1. **Rumex venosus** Pursh (VEINED DOCK). Stems stout, erect, 15-30 cm. high, from running rootstocks; leaves large, somewhat leathery, ovate to lanceolate, on short petioles; panicle short, dense in fruit; pedicels jointed at middle; the 3 inner sepals much enlarged in fruit, with conspicuous veined wings, a deep sinus at the base, from reddish to a deep maroon-red, without grain-like tubercles or callosities; achene with smooth, shining concave faces.

* Wings rather small, with tubercles.

2. **Rumex salicifolius** Weinm. (WILLOW-LEAVED DOCK). Stems clustered, erect or spreading, 3-6 dm. high; leaves lanceolate or narrower, tapering to both ends, petioled; racemes erect or spreading; pedicels jointed near the base; wings each bearing an ovoid tubercle on the back; achene acuminate, with concave faces.

3. POLYGONUM (KNOTWEED. SMARTWEED)

Herbs with conspicuous stipules sheathing the prominent joints of the stem, small flowers, a 5-parted often petal-like calyx, 4-9 stamens, 2 or 3 styles, and a triangular or lens-shaped achene.

1. **Polygonum aviculare** L. (DOORWEED). Slender and smooth, mostly prostrate or ascending, leafy throughout; leaves oblong to lanceolate, acutish; sheaths 2-lobed or lacerate; flowers in axillary clusters or in spikes with leafy bracts; sepals very small, with green and pinkish margins; stamens 8 (rarely 5); styles 3; nut dull and minutely granular. Yards and waste places.

2. **Polygonum bistortoides** Pursh (MOUNTAIN SMARTWEED). Stems 3-5 dm. high, slender; leaves mostly basal, oblong to linear, the cauline much reduced; flowers in a dense oblong spike terminating the scapose stem or peduncle, white or rose-colored; stamens and styles exserted; achene smooth and shining. Frequent in grassy mountain valleys and parks.

XVIII. NYCTAGINACEÆ (FOUR-O'CLOCK FAMILY)

Herbs with entire fleshy opposite leaves, the stems with swollen joints; calyx corolla-like, its persistent base constricted above the 1-celled, 1-seeded ovary and becoming an indurated pericarp (anthocarp).

1. ABRONIA (ABRONIA)

Stems branching, more or less glandular; peduncles axillary and terminal, bearing a terminal involucre cluster of several to many flowers; perianth tube elongated, with a 5-lobed limb.

* Annual; flowers small; fruit with 3-4 broad wings.

1. *Abronia micrantha* (Torr.) Chois. (SAND FLOWER). Prostrate, the extremities of the branches ascending; leaves ovate to oblong, obtuse; flowers several, greenish-red or pink; the limb not more than 3-5 mm. broad; wings of the fruit 3 or 4, broad, membranous, wholly encircling the fruit, emarginate at both ends, beautifully reticulated.

* * Perennial; flowers larger; fruit with 2-5 narrow wings.

2. *Abronia fragrans* Nutt. (WHITE ABRONIA. SNOWBALL). Stems several, spreading, 3-7 dm. long, viscid-pubescent; leaves ovate, obtuse, paired but differing in size; peduncle long; flowers numerous, white, forming a sub-spherical cluster, opening at night and very fragrant; fruit with narrow leathery wing, which do not close over the summit. Common on sandy plains.

XIX. PORTULACACEÆ (PURSLANE FAMILY)

Herbs with entire fleshy leaves, conspicuous flowers that open only in sunshine or bright daylight: sepals 2 (8 in *Lewisia*), separate or united; petals usually 5; stamens 3-many; styles 2-8-parted; capsule 1-celled.

1. *Portulaca*. Flowers yellow; stamens 7-20; capsule opening by a lid.

2. *Lewisia*. Flowers pink; stamens numerous; capsule globose, splitting from the base upward.

3. *Claytonia*. Flowers white, streaked with rose; stamens 3-5; capsule splitting into 3 pieces.

1. PORTULACA (PURSLANE)

Low herbs, with scattered leaves, sessile flowers, 2-cleft calyx, 5 or 6 ephemeral petals, 7-12 stamens, a 5- or 6-parted style, and a globular pod opening by a lid.

1. *Portulaca oleracea* L. ("PUSSLEY"). Prostrate and smooth; leaves obovate or wedgeform; petals pale yellow. Cultivated and waste ground.

2. **LEWISIA** (BITTER-ROOT)

Perennial, from thick fleshy roots ; leaves all radical ; petals large and showy.

1. **Lewisia rediviva** Pursh (RESURRECTION ROOT). Flowers 2-3 dm. broad, terminating a short scape which is jointed above the middle and bears a scarious involucre of 5-7 bracts. Common on stony ridges, especially northward. The "State flower" of Montana.

3. **CLAYTONIA** (SPRING BEAUTY)

Succulent herbs, with opposite leaves, racemose flowers, 2 persistent sepals, 5 petals, and a 3-cleft style.

* From large (for the plant) deep-set tubers.

1. **Claytonia lanceolata sessilifolia** Aven Nelson (MOUNTAIN SPRING BEAUTY). A single root-leaf (often wanting), a pair of fleshy, sessile, oblong-lanceolate stem-leaves ; flowers few-several, on a peduncle surpassing the leaves ; sepals subacute ; petals spatulate to obovate, entire, pale rose-color with purple veins. Common on moist, rich hillsides.

* * Annual, with stolons.

2. **Claytonia Chamissoi** Ledeb. (CHAMISSO'S CLAYTONIA). Stems weak and slender, decumbent, stoloniferous, rooting at the nodes ; leaves spatulate or oblanceolate, obtuse ; the white flowers racemose, on slender pedicels. In spring bogs and on wet banks.

XX. **CARYOPHYLLACEÆ** (PINK FAMILY)

Herbs with opposite entire leaves, usually 5 sepals (united or separate), 5 petals, 10 stamens (sometimes fewer), 2-5 styles, and a 1-celled ovary becoming a pod.

* Sepals united into a tube or cup ; petals clawed.

1. **Agrostemma**. Calyx 10-nerved, 5-lobed ; styles 5.

2. **Silene**. Calyx 5-toothed ; styles 3.

3. **Vaccaria**. Calyx strongly 5-angled ; styles 2.

* Sepals distinct ; petals not clawed.

4. **Cerastium**. Sepals, petals, and styles 5 ; petals bifid.

5. **Arenaria**. Sepals and petals 5 ; styles 3 ; petals entire.

1. **AGROSTEMMA** (COCKLE)

Annual herbs with linear-lanceolate leaves, large red flowers terminating axillary peduncles ; calyx narrowed at the throat, with linear foliaceous lobes ; capsule 1-celled.

1. **Agrostemma Githago** L. (CORN COCKLE). Erect, 3-8 dm. high, covered with long soft hairs ; calyx lobes longer than the broad purple-red petals. A weed in wheat fields ; introduced from Europe.

2. **SILENE** (CATCHFLY)

Herbs with solitary or clustered flowers, a 5-toothed calyx, 5 petals with slender stalk-like base, 10 stamens, 3 styles, a 1-3-celled ovary, and a pod opening at apex by 3 or 6 teeth.

1. **Silene antirrhina** L. (SLEEPY CATCHFLY). A slender, nearly glabrous annual, 3-5 dm. high, glutinous about the upper nodes; leaves from spatulate below to linear above; inflorescence an open cyme, the pink flowers on slender pedicels; calyx narrowly ovoid; petals obcordate. Common on dry sandy rocky banks and slopes.

3. **VACCARIA**

A smooth glaucous annual herb, with tubular, angled, 5-toothed calyx, 5 petals, 10 stamens, 2 styles, and a pod which splits at summit into 4 teeth.

1. **Vaccaria Vaccaria** (L.) Britt. (COW HERB or COCKLE). Erect, branching above into the wide-spreading cyme; leaves ovate to lanceolate, acute at apex and clasping at base, 3-5 cm. long; flowers small, white or rose color; calyx inflated in fruit. A common weed in cultivated grounds; introduced from Europe.

4. **CERASTIUM** (CHICKWEED)

Small pubescent herbs with weak stems, terminal cymes, white flowers having 5 sepals, 5 petals, 10 stamens, and 5 styles; a cylindric capsule opening by 10 teeth.

1. **Cerastium occidentale** Greene (WESTERN CHICKWEED). Tufted, with many sterile leafy shoots from the base; the numerous flowering stems somewhat decumbent, 1-2 dm. long, few-leaved; leaves broadly linear, acute; cyme few to several-flowered; peduncle, pedicels and calyx glandular-pubescent; sepals scarious-margined, acute, about 5 mm. long; petals and mature capsule about twice as long as the sepals. Common on open slopes and in grassy draws.

5. **ARENARIA** (SANDWORT)

Tufted herbs with slender sessile leaves, white flowers in cymes which are either compact (head-like) or more open; sepals and petals 5; styles 3; capsule globose or oblong, many-seeded and opening by either 3 or 6 teeth.

* Flowers in a close head.

1. **Arenaria congesta** Nutt. (CONGESTED SANDWORT). Many-stemmed from the crown of a thick tap-root, smooth, 1-2 dm. high; leaves subulate-linear, pointed, scabrous on the margins; flowers in 1-3 dense clusters, with large, dilated membranous bracts; petals nearly twice as long as the sepals. Frequent on open or wooded slopes.

* * Flowers in a more open cyme.

2. **Arenaria Fendleri** Gray (FENDLER'S SANDWORT). Similar to the preceding in habit, glandular above, the leaves serrulate-scabrous; flowers in an open cyme, small; sepals acuminate, about as long as the 6-7 mm. long, white, obovate petals, scarious-margined; seeds roughened. Dry open hillsides.

3. **Arenaria Hookeri** Nutt. (HOOKER'S SANDWORT). A caespitose perennial, the mats usually broad; leaves glabrous, crowded, stiff, awl-shaped and sharp-pointed, 1-2 cm. long; flowering stems short (5-10 cm.), pubescent; cyme crowded; bracts linear-lanceolate, with ciliate margins, exceeding the similar sepals; petals twice as long as the sepals. Frequent on barren stony hills and plains.

XXI. RANUNCULACEÆ (CROWFOOT FAMILY)

Herbs with flower parts all distinct, 3-15 sepals, petals 3-15 or wanting, numerous stamens or rarely few, and many or few pistils becoming either pods, achenes, or berries. (See *Plant Structures*, p. 259.) When the petals are wanting the calyx is often colored like a corolla.

* Fruit a follicle with several ovules.

+ Flowers regular.

1. **Caltha**. Leaves simple ; petals none ; sepals petal-like, 7-12 ; follicles several, forming a head.

2. **Aquilegia**. Leaves compound ; petals 5, produced backward into a hollow spur ; follicles 5.

+ + Flowers irregular.

3. **Delphinium**. Leaves palmately cleft or divided ; petals 4, the upper spurred and projecting backward into the spur of the upper one of the 5 petal-like sepals ; follicles many-seeded.

4. **Aconitum**. Leaves palmately lobed ; petals 2, covered by the upper sepal, which is arched into a hood or helmet ; follicles 3-5.

* * Fruit an achene.

+ Petals none or inconspicuous ; sepals petal-like.

5. **Anemone**. Flowers subtended by an involucre ; sepals indefinite ; achenes tailless.

6. **Pulsatilla**. Flowers subtended by an involucre ; sepals 5-7 ; achenes with long feathery tails.

7. **Clematis**. Involucres wanting ; sepals 4, valvate ; achenes tailed.

8. **Atragene**. Like *Clematis* ; the sepals very large ; small petals present.

+ + Sepals and petals both present.

9. **Ranunculus**. Petals yellow, with a nectariferous pit at the base ; achenes compressed ; leaves simple.

10. **Batrachium**. Petals white ; achenes transversely wrinkled ; leaves dissected.

11. **Cyrtorhyncha**. Petals yellow, narrow ; achenes terete ; leaves compound.

12. **Oxygraphis**. Petals yellow ; achenes longitudinally striate ; leaves simple, crenate.

1. **CALTHA** (MARSH MARIGOLD)

Smooth herbs with round or oblong leaves with cordate base ; sepals large, showy, early deciduous ; stamens numerous ; follicles many-seeded.

1. **Caltha rotundifolia** (Huth.) Greene (ELK SLIP). Leaves radical, rather thick, with narrow basal sinus, entire or dentate ; scapes 1-15 cm. high, one flowered ; sepals oblong-obovate, white or bluish on the outside. Abundant in wet sub-alpine parks.

2. **AQUILEGIA** (COLUMBINE)

Herbs with ternately compound leaves, lobed leaflets, large showy flowers terminating the branches, 5 sepals colored like the petals, 5 petals with short spread-

ing lip and produced backward into large hollow spurs much longer than the calyx, numerous stamens, and 5 pistils becoming erect follicles.

1. **Aquilegia caerulea** James (BLUE COLUMBINE). Glabrous, 3-8 dm. high ; leaves mostly radical, glaucous below, the leaflets lobed ; flowers large, varying from blue to white ; the spurs long and slender. This beautiful plant is the "State flower" of Colorado, and is said by gardeners to be the handsomest Columbine in the world. It is abundant in moist woods in the mountains.

2. **Aquilegia chrysantha** Gray (YELLOW COLUMBINE). Taller and more slender, with peduncles often pubescent ; flowers bright yellow, the spurs very slender. Wet ravines in mountains ; Colorado and southward.

3. DELPHINIUM (LARKSPUR)

Herbs with palmately divided leaves, flowers in terminal racemes, 5 petal-like sepals (the upper one prolonged into a spur at the base), 4 petals (the upper pair continued backward into long spurs inclosed in the calyx spur), numerous stamens, and 3 pistils becoming many-seeded pods. (See *Plant Structures*, p. 260, Fig. 244.)

1. **Delphinium scopulorum** Gray (MOUNTAIN LARKSPUR). Tall, 1 m. more or less, branching above ; leaves 5-7-parted, each lobe again cleft or parted, the divisions from lanceolate to narrowly linear ; inflorescence minutely cinereous-pubescent ; flowers blue ; ovaries minutely pubescent. Moist open woods.

2. **Delphinium Geyeri** Greene (GEYER'S LARKSPUR. POISON-WEED). A tufted perennial with numerous thick fibrous-woody roots, canescently tomentose, 3-6 dm. high ; root-leaves numerous, stem-leaves few (especially upward), all cleft into many linear divisions ; flowers in a strict raceme, blue, with a stoutish spur. Common on the plains, where the dense tufts of root-leaves appear in early spring, offering a tempting mouthful to hungry cattle ; sometimes eaten with fatal results.

3. **Delphinium Nelsonii** Greene (NELSON'S LARKSPUR). Perennial from a cluster of tuberous roots ; stem slender, nearly simple, 1-3 dm. high, finely pubescent ; leaves cleft into broadly linear divisions ; flowers blue, somewhat pubescent, the lower petal 2-cleft, with a tuft of hair near the middle. Common in the loose soil of draws in the foothills.

4. ACONITUM (MONKSHOOD)

Erect perennial herbs with showy flowers ; sepals 5, petal-like ; stamens numerous.

1. **Aconitum Columbianum** Nutt. (MOUNTAIN MONKSHOOD). Stem 1 m. or more high, pubescent above, with short viscid hairs ; leaves large, the lobes toothed or cut ; flowers purple, in a loose raceme. Moist open woods.

5. ANEMONE (ANEMONE)

Erect perennial herbs ; radical leaves petioled, lobed or parted ; those of the stem forming an involucre ; stamens numerous ; achenes compressed, pointed.

1. **Anemone Canadensis** L. (CANADA ANEMONE). Somewhat pubescent ; leaves large, 5-7-cleft, and the lobes more or less toothed ; those of the involucre similar but sessile ; flowers solitary, on bifurcate peduncles with secondary involucre ; sepals large and white ; achenes flat, nearly glabrous, in globose heads. Common on the banks of streams.

2. **Anemone globosa** Nutt. (ROUND-FRUITED ANEMONE). Stems slender, 1-3 dm. high, silky, as are also the leaves, which are dissected into narrow lobes; flowers 1 or more; the sepals red or dull crimson, 6-10 mm. long; the oblique, pointed, densely woolly achenes in a globose head.

6. PULSATILLA (PASQUE FLOWER)

Perennial herbs, from thick semi-woody roots, densely soft hairy throughout; stems scapose and 1-flowered; sepals petal-like; stamens very numerous and the achenes with long feathery tails.

1. **Pulsatilla hirsutissima** (Pursh) Britt. (AMERICAN PASQUE FLOWER). Leaves all radical, dissected, the divisions narrow; stems naked but for the dissected involucre, which is some distance below the single large flower, the blossoms opening before the leaves appear; sepals large, ovate-oblong, purplish, varying to nearly white. In early spring, in moist cañons and on wooded slopes.

7. CLEMATIS (VIRGIN'S BOWER)

Perennial herbs or semi-woody climbers with opposite, petioled, pinnately compound or parted leaves; the genus is easily recognized by its 4 valvate sepals and the long-tailed achenes.

1. **Clematis ligusticifolia** Nutt. (WESTERN VIRGIN'S BOWER). Stem climbing, more or less woody; leaves mostly pinnately 5-foliate, the leaflets incisely toothed or trifid, nearly glabrous; the white flowers in leafy panicles; sepals equaling the stamens. Clambering over bushes on creek banks.

2. **Clematis Douglasii** Hook. (DOUGLAS'S CLEMATIS). An erect, tufted, somewhat villous herb, 3-6 dm. high; leaves pinnatifid, the divisions linear or linear-lanceolate; sepals 3-4 cm. long, thick, deep purple within, paler on the outside, valvate, only the villous tips spreading; achenes silky, with tails 2-3 cm. long. Moist slopes in open woods.

8. ATRAGENE (VIRGIN'S BOWER)

Climbing vines much like *Clematis*; of the numerous stamens, a few of the outer ones have the filaments broadened (petal-like); sepals large and showy; the long styles plumose

1. **Atragene Americana** Sims (PURPLE VIRGIN'S BOWER). Leaves trifoliate, with thin, ovate, acute leaflets; the four large sepals widely spreading, thin, strongly veined, and pubescent on the veins and margins. Moist wooded hillsides.

9. RANUNCULUS (BUTTERCUP)

Herbs with alternate leaves, solitary or clustered yellow (sometimes white) flowers, 5 sepals, 5 (rarely more) flat petals, numerous stamens, and numerous pistils becoming a head of mostly flattened and pointed achenes. (See *Plant Structures*, p. 222, Fig. 202.)

* Radical leaves undivided; low (mostly less than 15 cm.).

1. **Ranunculus ellipticus** Greene (BRIGHT-FACED BUTTERCUP). Stems 5-10 cm. high, 1-several-flowered; leaves smooth; the root-leaves entire, mostly elliptic; the stem-leaves few, generally 3-cleft to about the middle; flowers large, 18-25 mm. across; the petals twice as long as the sepals, bright yellow, glossy

and shining ; achenes with a short beak. Moist hillsides and draws. Very early spring.

2. *Ranunculus inamœnus* Greene (HOMELY BUTTERCUP). Taller, at length 20 cm. or more high, sparsely pubescent ; root-leaves broadly oval, crenately toothed at summit, on petioles 2-3 times as long as the blade ; stem-leaves sessile, ternately divided into oblanceolate segments ; petals 5, obovate-oblong, about 5 mm. long ; achenes pubescent, in a small ovoid head. Moist parks and valleys.

* * Leaves all cleft or parted ; tall (20-30 or more cm. high).

3. *Ranunculus acriformis* Gray (WYOMING BUTTERCUP). Tall and slender, often 3 or more dm. high, pubescent ; leaves all 3-5-parted, the segments 2-3-cleft into linear divisions ; petals broadly obovate, 5-7 mm. long ; achenes with a broad curved-hook beak shorter than the body. Common in wet meadows and on grassy stream banks.

4. *Ranunculus Macounii* Britt. (MACOUN'S BUTTERCUP). Stems coarse, 2-5 dm. high, with spreading branches, the whole plant rather roughly hairy ; leaves large, 3-divided to the base, the ovate divisions (leaflets) variously parted and cleft into acute segments ; petals about 5 mm. long ; achenes in a sub-globose head, with a short pointed beak.

5. *Ranunculus eremogenes* Greene. A light-green, very glabrous plant, with thick or swollen hollow stems, 1-2 dm. high ; leaves 5-parted and the segments lobed, the lobes toothed ; petals light yellow, longer than the sepals ; the numerous achenes in an oblong head, small, smooth, and nearly beakless, falling from the receptacle when dry. Very common in the margins of spring bogs and ponds.

10. BATRACHIUM (WATER-CROWFOOT)

Perennial aquatic herbs, with finely dissected leaves and white flowers ; otherwise nearly as in *Ranunculus*.

1. *Batrachium trichophyllum* (Chaix) Bossch. (WHITE WATER-CROWFOOT). Submerged ; stems slender ; leaves petioled, the segments linear ; flowers on stout peduncles, blooming at the surface of the water ; achenes beakless. In ponds and sluggish streams.

11. CYRTORHYNCHA

Characters nearly those of *Ranunculus* ; the long-petioled bipinnately divided or compound leaves, the narrowly spatulate petals, and the longitudinally ribbed, thin-walled, slightly inflated achenes will serve to distinguish it.

1. *Cyrtorhyncha ranunculina* Nutt. (NUTTALL'S BUTTERCUP). Tufted, with many slender stems and long-petioled root-leaves, 1-2 dm. high ; leaflets with oblong or linear lobes ; sepals yellowish, almost as long as the petals ; achenes in a globular head, oblong-cylindric, tipped with the incurved style.

12. OXYGRAPHIS

Much like *Ranunculus*, but the stems scape-like, the achenes flattened and longitudinally striate on the faces.

1. *Oxygraphis Cymbalaria* (Pursh) Prantl. (SEASIDE CROWFOOT). Small, mostly less than 1 dm. high, spreading by runners which root at the nodes ; leaves mostly basal, oval with cordate base : flowers 1-5 ; the petals 5-9 ; achenes in an oblong head, tipped with a sharp point. Common on wet alkaline flats and ditch banks.

XXII. BERBERIDACEÆ (BARBERRY FAMILY)

Low shrubs with alternate compound leaves without stipules; sepals 6, petals 6, and the 6 sensitive stamens opposite them; the anthers open at the top by uplifted valves; the single pistil becomes a 1-3-seeded berry.

1. BERBERIS (BARBERRY)

Shrubs with yellow wood and yellow flowers in dense racemes; the style short and the stigma peltate.

1. **Berberis Aquifolium** Pursh (TRAILING BARBERRY. OREGON GRAPE). Low, mostly creeping among rocks or on stony slopes; the leaves evergreen; leaflets 3-7, ovate, acute, spiny-toothed; racemes terminal; the berries blue or purple.

XXIII. PAPAVERACEÆ (POPPY FAMILY)

Herbs with alternate leaves, 2 ephemeral or scale-like sepals, 4-6 petals, 6 to many stamens (opening lengthwise), and a single pistil; the fruit a 1-celled pod or capsule.

1. **Argemone**. Stem spiny; sap yellow; leaves glaucous.

2. **Enomegra**. Stem spiny and densely hispid; sap milky; leaf not glaucous.

3. **Capnoides**. Stems smooth; sap watery; leaves decompose and glaucous.

1. ARGEMONE

Spiny branching herbs, with sessile, lobed, spiny-toothed leaves, which are glaucous and more or less blotched with white; flowers large and showy, with 2-3 sepals bearing a horn-like spine near the tip; capsule spiny, opening by several valves at summit.

1. **Argemone intermedia** Sweet. (SPINY POPPY). Tall, often 1 m. high, freely branching; flowers white, 6-9 cm. broad; the petals broadly obovate. Common on sandy plains.

2. ENOMEGRA

Characters much like those of *Argemone*, but the stem and leaves densely bristly and less spiny; the leaves a dull green with some puberulence and slightly if at all glaucous; sap thick, milky-white.

1. **Enomegra hispida** (Gray) Aven Nelson (HISPID POPPY). Erect, branching, 4-8 dm. high; sepals hispid on the horn-like tip; petals white, obovate, about 3 cm. long; capsule armed with stout, hispid spines. Frequent on sandy slopes and valleys.

3. CAPNOIDES

Pale leafy-stemmed herbs, with compound dissected leaves and racemes of yellow flowers; 2 small sepals and 4 connivent petals (1 of the outer is spurred

and the 2 inner are keeled), all early deciduous; stamens 6, in 2 sets, opposite the outer petals; capsule linear.

1. **Capnoides aureum** (Willd.) Kuntze (GOLDEN CAPNOIDES). Tufted, the many leafy stems spreading; leaves dissected, the segments oblong or cuneate; flowers golden yellow, the spur shorter than the rest of the flower; pod spreading or drooping, distinctly torulose; the seeds black and shining or obscurely reticulated. Sandy or stony draws and banks.

2. **Capnoides montanum** (Engelm.) Britt. (MOUNTAIN CAPNOIDES). Very similar but with lighter green, more finely dissected foliage; the pods ascending or erect, terete and not torulose. This species is the more frequent in the southern part of our range and the preceding northward and eastward.

XXIV. CRUCIFERÆ (MUSTARD FAMILY)

Herbs, usually pungent, with alternate leaves, terminal clusters of flowers, 4 sepals, 4 petals, 6 stamens (4 long and 2 short), and a 2-celled pod. (See *Plant Structures*, p. 261, Fig. 246.)

* Flowers white.

+ Siliques flattened contrary to the partition, short (less than 8 mm.).

3. **Thlaspi**. Petals conspicuous; siliques obovate, with keeled and obscurely wing-margined sides.

9. **Bursa**. Petals small; siliques obcordate-cuneate, not winged.

2. **Lepidium**. Petals either inconspicuous or evident; siliques much compressed, orbicular or elliptic.

+ + Siliques linear; seeds in 1 row, about 2 cm. long.

6. **Cardamine**. Petals large; siliques erect, with a short thick style.

** Flowers yellow.

+ Siliques globose to oblong, short (not more than 8 mm.).

10. **Draba**. Siliques oblong, flattened parallel to the partition.

8. **Lesquerella**. Siliques globose or ellipsoidal, stellate-pubescent.

7. **Physaria**. Siliques didymous, the cells globose-inflated, stellate-pubescent.

+ + Siliques on a long stipe, linear, 3 cm. or more long.

1. **Stanleya**. Siliques flattened, with an evident mid-nerve.

+ + + Siliques terete, from linear oblong to long linear.

5. **Roripa**. Siliques linear-oblong, 9-12 mm. long leaves pinnatifid.

4. **Sisymbrium**. Siliques linear, 3-5 cm. long.

+ + + Siliques 4-angled, linear, 2-8 cm. long.

11. **Cheiranthus**. Petals long-clawed, with a flat blade.

1. STANLEYA

Perennials with large roots and large glaucous pinnatifid leaves; flowers in long naked terminal racemes of yellow flowers.

1. **Stanleya pinnata** (Pursh) Britt. (STANLEYA). Stems 5-10 dm. high ; leaves from nearly entire to deeply pinnatifid ; sepals linear, the petals with a long claw ; filaments exserted ; siliques 2-3 times as long as the style.

2. LEPIDIUM (PEPPER-GRASS)

Herbaceous plants with entire, toothed or pinnatifid leaves and mostly small white flowers.

1. **Lepidium ramosissimum** Aven Nelson (BRANCHED PEPPER-GRASS). Freely branched from the base up, 2-4 dm. high ; leaves pinnately toothed ; petals small, spatulate, half as long as the sepals ; the fruiting racemes long and numerous ; siliques ovate with a broad shallow sinus. Waste grounds and open stony plains.

2. **Lepidium montanum** Nutt. (LARGE-FLOWERED LEPIDIUM). Stems several, 1-2 dm. long, loosely spreading ; leaves pinnatifid ; flowers conspicuous, white or yellowish-white ; siliques elliptical, with a shallow notch and an evident style. Frequent on alkaline flats.

3. THLASPI (PENNY CRESS)

Small perennials with mostly entire leaves, conspicuous white flowers, and obcuneate siliques.

1. **Thlaspi Coloradense** Rydb. (COLORADO CANDYTUFT). The stems few to many from the crown of a tap-root, 5-10 cm. long ; root-leaves rosulate, elliptic or broader, petioled ; stem-leaves ovate, sessile by an auricled base ; the silique about 6 mm. long, obscurely retuse. Moist draws in the foothills.

4. SISYMBRIUM

Slender perennial herbs, glabrous, with nearly entire linear-oblong leaves.

1. **Sisymbrium linifolium** Nutt. (MOUNTAIN MUSTARD). Glabrous and glaucous, 3-5 dm. high, with several slender simple stems ; leaves thick ; flowers light yellow ; siliques divaricate, on short pedicels ; seeds in 1 row. Frequent on sandy plains and slopes.

5. RORIPA (CRESS)

Perennial herbs from rhizomes, with sinuate pinnatifid leaves ; flowers with spreading sepals and conspicuous petals.

1. **Roripa sinuata** (Nutt.) A. S. Hitch. (SPREADING CRESS). Stems several, spreading-prostrate, 1-3 dm. long ; leaves oblong-lanceolate in outline, mostly deeply pinnatifid ; siliques acute at both ends, often curved, beaked by a slender style. Abundant in wet, waste grounds and on saline flats.

2. **Roripa Nasturtium** (L.) Rusby (TRUE WATER-CRESS). Stems spreading and rooting ; leaves with 3-11 roundish or oblong nearly entire leaflets ; petals white, twice the length of the calyx ; pods linear, ascending on slender widely spreading stalks. Cultivated from Europe, but escaped into brooks and ditches.

6. CARDAMINE (BITTER CRESS)

Erect glabrous plants, growing along streams, with rather large white flowers ; the leaves lobed or lyrate-pinnate ; siliques flattened, mostly linear.

1. *Cardamine vallicola* Greene (CREEK-BANK CRESS). Stems clustered, 2-4 dm. high, rather stout; leaves green with a few scattered hairs on the margins, deeply lyrate-pinnatifid, the leaflets 5-9, the terminal one large; siliques erect on ascending pedicels, linear, tapering to the style.

7. PHYSARIA (BLADDER-POD)

Low perennial herbs, with entire leaves; the yellow flowers in terminal racemes, and the silique membranous-inflated, the two cavities sub-globose.

1. *Physaria didymocarpa* (Hook.) Gray (DOUBLE BLADDER-POD). Stellately pubescent throughout, the several stems and numerous root-leaves crowded on the crown; leaves broadly spatulate or obovate; flowers large; siliques deeply emarginate above and below.

8. LESQUERELLA (BLADDER-POD)

Low herbs much like *Physaria* except as to the silique, which is globose or ellipsoidal and much smaller.

1. *Lesquerella argentea* (Pursh) MacM. (SILVERY BLADDER-POD). Stellate-pubescent throughout; stems several, slender; leaves linear or narrowly oblanceolate, 3-6 cm. long; the yellow flowers conspicuous, with petals 5-6 mm. long; pedicels 1-2 cm. long, in fruit recurved; silique globose or nearly so, with a slender style as long as the silique. Common on sandy plains.

2. *Lesquerella montana* (Gray) Wats. (MOUNTAIN BLADDER-POD). Resembling the preceding; root-leaves from oblanceolate to broadly obovate, petioled; siliques elliptical, 5-6 mm. long, equaled by the slender style, erect, on widely spreading, curved pedicels. Stony slopes and hilltops.

3. *Lesquerella condensata* Aven Nelson (COMPACT BLADDER-POD). Leaves and stems very short and crowded, forming a small sub-spherical tuft, stellate-pubescent throughout; flowers crowded, the spatulate petals about 6 mm. long; silique ovate, compressed at summit, about 5 mm. long, equaled by the slender style. Mostly on naked stony slopes; flowering very early.

9. BURSA

Low plants with clustered pinnatifid basal leaves, arrow-shaped, sessile stem-leaves, an elongating raceme of small white flowers, and an obcordate-triangular silique flattened contrary to the narrow partition.

1. *Bursa Bursa-pastoris* (L.) Britt. (SHEPHERD'S PURSE). Annual, 2-4 dm. high, somewhat pubescent with forked hairs; flowers small. A very common weed in waste ground. Introduced from Europe.

10. DRABA (WHITLOW-GRASS)

Small herbs, annual or perennial, entire toothed leaves, the yellow flowers in naked racemes; sepals equal and the silique narrowly oblong, sub-acute at both ends.

1. *Draba nemorosa* L. (WOOD WHITLOW-GRASS). Annual, sparsely pubescent with forked hairs; 1 or more slender stems from the base; leaves elliptic to broadly ovate, entire or toothed, sessile; flowers small; silique 10-12 mm. long, on slender, widely spreading pedicels about twice as long; stigma sessile. Common on wet grassy banks.

2. ***Draba saximontana*** Aven Nelson (ROCKY MOUNTAIN DRABA). Perennial, caespitose, the woody caudex of very numerous slender branches; leaves linear, short, densely crowded on the base of the stems; the yellow petals about twice as long as the elliptic sepals; silique ovate, sub-acute, shorter than the pedicel; style short but evident. Frequent on stony ridges or sandy cliffs in the foothills.

11. CHEIRANTHUS (WALL FLOWER)

Simple or branched herbs with roughish pubescence; flowers rather large with erect sepals, the petals with spreading blade; silique long-linear, 4-angled.

1. ***Cheiranthus asper*** Nutt. (WESTERN WALL FLOWER). Stem mostly simple, 3-6 dm. high; leaves oblanceolate, tapering into a petiole, entire or dentate; the upper narrower and sessile; flowers large, about 15 mm. high and nearly as broad; silique 4-sided, 5-8 cm. long, widely spreading. Very common in early spring on sandy slopes and plains.

2. ***Cheiranthus inconspicuus*** (Wats.) Greene. Freely branched above and less pubescent; the flowers smaller; the silique slenderer, half as long and nearly erect. Plains and sandy river banks.

XXV. CAPPARIDACEÆ (CAPER FAMILY)

Herbs, with alternate leaves and perfect flowers, the sepals and petals as in *Cruciferae*, stamens 6 or more (not tetradynamous), pod 1-celled with 2 parietal placental and reniform seeds. Rank-smelling weeds.

1. ***Cleome***. Pod long stipitate, drooping.

2. ***Polanisia***. Pod sessile or nearly so, erect.

1. CLEOME (CLEOME)

Erect branching annuals, with leaves digitately 3-5-foliolate; conspicuous flowers in bracteate racemes; fruit long-stalked, elongated, with many seeds.

1. ***Cleome serrulata*** Pursh (PINK CLEOME. ROCKY MOUNTAIN BEE-PLANT). Glabrous and erect, tall and branching, often nearly 1 m. high; leaves trifoliolate; the leaflets lance-oblong, remotely serrulate, 4-8 cm. long; bracts lanceolate-linear; the showy flowers pink (rarely white); fruiting raceme long; pod compressed, nearly linear, longer than the stipe, which about equals the pedicel. A weed in waste grounds. A reputed honey plant.

2. POLANISIA (CLAMMY WEED)

Annual herbs resembling *Cleome*; petals emarginate, clawed; stamens 8-16, exserted; pod sessile.

1. ***Polanisia trachysperma*** T. & G. Glandular-viscid, 2-4 dm. high; leaves trifoliolate; the leaflets lanceolate; flowers large, pinkish or yellowish; stamens exserted, with purple filaments; pod lanceolate-linear, seeds usually pitted or roughened. Sandy cañons and bottom lands.

XXVI. CRASSULACEÆ (ORPINE FAMILY)

Usually fleshy herbs with sessile leaves, flower parts all of the same number or the stamens double, and fruit a pod.

1. SEDUM

Smooth thick-leaved herbs with flowers sessile along one side of spreading flowering branches, the first or central flower mostly with 5 sepals and petals and 10 stamens, the others often with 4 sepals and petals and 8 stamens, and 4 or 5 distinct pistils ripening into many-seeded pods.

1. *Sedum stenopetalum* Pursh (STONECROP). A tufted glabrous fleshy perennial, 8-15 cm. high; leaves crowded, terete, acute, sessile, about 1 cm. long; flowers bright yellow. Very common on stony slopes. Foliage often deeply tinged with red before flowering.

XXVII. SAXIFRAGACEÆ (SAXIFRAGE FAMILY)

Herbs or shrubs with alternate and opposite leaves usually without stipules, mostly 10 stamens, and a 1-5-celled superior or inferior ovary becoming a pod.

* Herbs.

1. *Saxifraga*. Petals entire; ovary of 2 nearly distinct cells with divergent tips.

2. *Tellima*. Petals cleft; ovary 1-celled, with 2 or 3 short styles.

3. *Heuchera*. Petals entire, minute; ovary 1-celled, the capsule 2-beaked.

4. *Parnassia*. Petals fringed, large; ovary 1-celled, with 3 or 4 sessile stigmas.

** Shrubs.

5. *Edwinia*. Leaves serrate; cymes 5-10 flowered.

6. *Fendlera*. Leaves entire; flowers 1-3.

1. SAXIFRAGA (SAXIFRAGE)

Herbs with clustered basal leaves, stems naked or with alternate leaves, a terminal cluster of flowers, a 5-cleft calyx, 5 entire petals, 10 stamens, 2 styles, and a 2-celled ovary becoming a 2-beaked pod or 2 almost separate and divergent pods. (See *Plant Structures*, p. 58, Fig. 48.)

1. *Saxifraga rhomboidea* Greene (SNOW-BALL SAXIFRAGE). Stem a stout leafless scape, 1-2 dm. high; leaves a rosulate tuft at the base, from rhombic-ovate to oval, toothed or crenate, on short broad petioles; the small white flowers in a dense spherical head about 2 cm. in diameter, in fruit more open. Abundant on moist slopes in the foothills; early spring.

2. *Saxifraga punctata* L. Stemless; the leaves long-petioled, nearly glabrous, reniform or orbicular, deeply dentate; scapes 3-5 dm. long; flowers in an open panicle; peduncle, pedicels and free calyx glandular; petals white, oval or orbicular. Frequent on the banks of cold sub-alpine rivulets.

2. TELLIMA

Perennials with palmately divided leaves, the petioles with stipule-like dilations at base; calyx adhering to the lower half of the ovary; the 3-7-cleft petals conspicuous; stamens 10.

1. *Tellima parviflora* Hook. (SMALL-FLOWERED TELLIMA). The cuneate divisions of the leaves again 3-cleft, pubescent, as are also the few-leaved slender stems; flowers terminal in a single raceme; the petals 3-cleft into linear-oblong divisions.

2. *Tellima tenella* Wats. (SLENDER TELLIMA). Similar to the preceding, but the pubescence glandular, the leaves smaller (1 cm. in diameter); the petals 3-5 parted into mostly linear divisions, the ovary nearly free.

3. HEUCHERA (ALUM ROOT)

Herbs with rounded heart-shaped basal leaves (those of the stem, if any, alternate), greenish or purplish flowers in long clusters, a 5-cleft bell-shaped calyx, 5 small spatulate and entire petals, 5 stamens, 2 slender styles, and a 1-celled ovary becoming a pod.

1. *Heuchera parvifolia* Nutt. (SMALL-LEAVED HEUCHERA). Scabrous-puberulent; root large and woody; the naked scape 2-5 dm. high; leaves roundish-cordate, crenately 5-7-lobed; flowers at first crowded, at length an open raceme; petals inconspicuous, short-lived; seeds roughened (under lens). Frequent on rocky banks.

4. PARNASSIA (GRASS OF PARNASSUS)

Smooth perennial herbs, with the leaves entire and chiefly radical and the large solitary flowers terminating the long naked stems.

1. *Parnassia fimbriata* Banks (FRINGED PARNASSIA). Leaves reniform or cordate; petals short-clawed, fringed below the middle; a cluster of 5-9 united sterile filaments alternate with the stamens.

5. EDWINIA (Named for EDWIN JAMES)

A branching shrub 6-10 dm. high; petals white, obovate; alternate stamens shorter; capsule included in the enlarging calyx.

1. *Edwinia Americana* T. & G. (*Jamesia*). Flowers 5-10 in each cyme; petals glabrous or soft hairy within, longer than the sepals but the latter enlarged and leaf-like in fruit. On cañon sides and among rocks of the cliffs.

6. FENDLERIA (Named for AUGUSTUS FENDLER)

An erect pubescent shrub with entire leaves; calyx tube 8-nerved; petals clawed, emarginate at apex; filaments 2-forked at apex, the lobes surpassing the anther; capsule crustaceous, the seeds reticulate, winged below.

1. *Fendleria rupicola* Eng. & Gray (FENDLERIA). Leaves oblong-lanceolate, 3-nerved at base; the branches striate; flowers large, white, 1-3 on the ends of the short branchlets. Frequent in the cañons of southwestern Colorado.

XXVIII. GROSSULARIACEÆ (GOOSEBERRY FAMILY)

Like *Saxifragaceæ*, but shrubs with alternate palmately veined and lobed leaves, 5 stamens, an inferior 1-celled ovary and fruit a berry.

1. RIBES (CURRANT, GOOSEBERRY)

Low sometimes prickly shrubs with lateral clusters of small flowers, a 5-lobed often colored calyx, 5 small petals in the throat of the calyx, and 2 separate or more or less united styles.

* Branches prickly or bristly; gooseberries.

1. *Ribes irriguum* Dougl. (CREEK-BANK GOOSEBERRY). Stems branched, 1-2 m. high, generally prickly, subaxillary spines usually 3; leaves roundish, 5-lobed, mostly cordate at base, nearly glabrous; peduncles 2-4-flowered; calyx cylindrical, the lobes reflexed; the petals fan-shaped; fruit dark purple, very acid. Common on stream banks. Very fruitful.

2. *Ribes parvulum* (Gray) Rydb. (CURRANT GOOSEBERRY). Stems hispid, procumbent, mostly less than 1 m. high; leaves sub-orbicular, 3-5-parted or lobed, cordate at base, nearly glabrous, 2-4 cm. long; flowers in 5-12-flowered racemes; berry small and currant-like, nearly black when ripe, covered with short weak gland-tipped bristles. Frequent on the shaded banks of mountain brooks.

* * Branches without prickles or bristles; currants.

+ Leaves convolute in bud; flowers yellow; calyx long.

3. *Ribes aureum* Pursh (GOLDEN, BUFFALO, OR MISSOURI CURRANT). Smooth bush with rounded 3-lobed and cut-toothed leaves; short racemes of spicy-scented bright-yellow flowers; tube of yellow calyx much longer than the spreading lobes; berries blackish. Commonly cultivated but also indigenous; abundant.

+ + Leaves plicate in bud; flowers white, pink, or rose-color; calyx-tube short.

4. *Ribes cereum* Dougl. (SQUAW CURRANT). Sparingly glandular-pubescent; the leaves 3-5-lobed, the lobes crenate; flowers nearly sessile; the calyx white or pink, dilated above the ovary; petals minute; berry red, rather insipid. A common shrub in cañons and on dry stony hillsides.

5. *Ribes floridum* L'Her. (WILD BLACK CURRANT). Leaves orbicular, sharply 3-5-lobed, glabrous above, pubescent and sprinkled with resinous dots below; flowers white or pinkish; bracts longer than the pedicels; the calyx-lobes short and obtuse; berry large.

6. *Ribes variegatum* (Wats.) Aven Nelson (DRY-FRUITED CURRANT). Moderately branching, 5-10 dm. high, smooth stemmed, lightly glandular-pubescent; leaves deeply 5-cleft, lobes obtuse; calyx red, the lobes not reflexed; young fruit glandular-hairy, becoming maroon or black, rather tough, and devoid of juice. Frequent on wooded mountain-stream banks.

XXIX. **ROSACEÆ** (ROSE FAMILY)

Herbs or shrubs with alternate stipulate leaves, usually 5 more or less united sepals, as many petals, numerous stamens (with the petals) on the calyx-tube, numerous superior ovaries (sometimes enclosed in the calyx-tube), and fruits various. (See *Plant Structures*, p. 262.)

* Stems shrubby, at least biennial.

+ Carpels few, becoming follicles.

1. **Opulaster**. Carpels 1 or 2; flowers white, in a short, umbel-like corymb.

2. **Holodiscus**. Carpels 5; flowers white, in ample panicles.

+ + Carpels few to many, becoming achenes.

3. **Kunzia**. Carpels 1 (rarely 2), large; flowers yellow, terminal.

4. **Rubus**. Carpels many, becoming drupelets; flowers white, conspicuous.

5. **Dasyphora**. Carpels many, becoming dry achenes; flowers yellow, showy.

12. **Cercocarpus**. Carpel 1, becoming an achene with a long plumose tail; petals none.

13. **Rosa**. Carpels several, becoming bony achenes inclosed in the fleshy receptacle; flowers large and showy.

* * Stems herbaceous.

+ Carpels borne on an enlarged pulpy edible receptacle.

6. **Fragaria**. Carpels many; flowers white, conspicuous.

+ + Carpels dry achenes; style deciduous, receptacle not enlarged.

7. **Argentina**. Carpels many; style lateral; stems creeping, with pinnate leaves; flowers yellow.

8. **Potentilla**. Carpels many; style terminal or nearly so; leaves pinnate or palmate; flowers yellow.

9. **Drymocallis**. Carpels many; style basal; stems erect, with pinnate leaves; flowers yellow or yellowish.

+ + + Carpels dry achenes; style persistent; leaves interruptedly pinnate.

10. **Geum**. Carpels many; style jointed above, the upper part deciduous; flowers yellow.

11. **Sieversia**. Carpels many; style not jointed, plumose or naked.

1. **OPULASTER** (NINE-BARK)

Branching shrubs, with simple palmately lobed leaves, white flowers in umbel-like corymbs, campanulate calyx, 5 petals, 20-40 stamens inserted with the petals, and 1-5 pistils.

1. **Opulaster monogynus** (Torr.) Kuntz (COLORADO NINE-BARK). Stems with shreddy bark, 7-15 dm. high; leaves glabrous and bright green, 2-3 cm. long, ovate-cordate, the lobes toothed; inflorescence a capitate-corymb, nearly glabrous; petals obovate, exceeding the glabrous sepals; carpels 2 (rarely only 1), united below, divergent above. Frequent in mountains and cañons.

2. **Opulaster pubescens** Rydb. (WYOMING NINE-BARK). Very similar to the preceding, the young shoots often unbranched, finely pubescent, especially in the inflorescence; calyx stellate-pubescent, its lobes obtuse; the ovaries pubescent and in fruit but slightly divergent. Common on rocky slopes.

2. HOLODISCUS

A freely branched shrub, with light-gray bark, numerous white flowers in large spreading panicles, a deeply 5-cleft calyx, oblong petals, and 5 pubescent carpels.

1. **Holodiscus dumosus** (Nutt.) Heller. Usually less than 1 m. high, erect or spreading, the branchlets slender, pubescent; leaves obovate, dentate, the base cuneate, pubescent or even tomentose beneath; panicle pubescent, the small petals scarcely longer than the ovate acute sepals.

3. KUNZIA

A small, freely branched, spreading or prostrate shrub, with small fascicled leaves, funnel-shaped calyx, yellow petals, about 25 stamens, and 1 (rarely 2) pubescent carpels.

1. **Kunzia tridentata** (Pursh) Spreng. Leaves cuneate-obovate, 3-lobed or toothed at apex, white-tomentose beneath, greener above; calyx tomentose, and with some glandular hairs; the broadly spatulate petals exceeding the calyx. Frequent, sandy cañons and foothills.

4. RUBUS (BRAMBLE)

Herbs or somewhat shrubby plants with usually compound leaves and mostly white flowers, a 5-parted calyx, and usually many small fleshy stone fruits collected on a dry or fleshy receptacle.

* Leaves simple; stems not prickly.

1. **Rubus parviflorus** Nutt. (SALMON-BERRY). Stems erect, 8-16 dm. high, glandular-pubescent when young, becoming brown and shreddy; leaves large, palmately 5-lobed, 1-2 dm. broad, more or less glandular-pubescent; flowers few, large, white; the calyx densely tomentose; berry pubescent, broad and flat, red, flavor excellent.

2. **Rubus deliciosus** James (UNSAVORY RASPBERRY). Stems either strict or branched, about 1 m. high, pubescent but not glandular; leaves reniform-orbicular, somewhat lobed, the lobes finely serrate, 2-5 cm. broad; flowers large, white, 3-4 cm. across; fruit smooth, large, purplish, "not agreeable to the human palate but prized by bears." Cañons of Colorado.

** Leaves compound; stems prickly.

3. **Rubus strigosus** Michx. (WILD RED RASPBERRY). Stems woody, upright, with stiff straight bristles; leaflets 3-5, ovate, pointed, serrate; petals as long as the sepals; fruit light red. Thickets and hills. (See *Plant Structures*, p. 262, Fig. 248.)

5. DASYPHORA

Shrubs with pinnate, stipulate leaves; solitary or cymose flowers (bracts, sepals, and petals 5 each), and a lateral, club-shaped, glandular style.

1. **Dasyphora fruticosa** (L.) Rydb. (SHRUBBY CINQUEFOIL). Stem erect, shrubby, 3-12 dm. high, much branched; leaves pinnate; leaflets 5-7, crowded,

lanceolate, entire, silky; flowers numerous, with yellow rounded petals; achenes densely hairy. Wet grounds.

6. FRAGARIA (STRAWBERRY)

Low herbs with runners, a cluster of palmate basal leaves, the 3 leaflets obovate and serrate, the naked stem terminated by a cluster of white flowers which are nearly as in *Potentilla*, but the receptacle in fruit much enlarged and conical, becoming pulpy and scarlet and bearing the minute dry achenes scattered over its surface. (See *Plant Relations*, p. 57, Fig. 47.)

1. **Fragaria glauca** (Wats.) Rydb. (MOUNTAIN STRAWBERRY). Sparingly appressed-silky; the leaves thin and glaucous; leaflets obovate, short petioled, coarsely toothed, the lateral ones oblique at base; scape few-flowered, about equaling the leaves; achenes in shallow pits. The most frequent of our wild strawberries.

2. **Fragaria prolifica** Baker & Rydb. (FRUITFUL STRAWBERRY). Similar, but with very short thick rootstock, the leaves strongly veined beneath, green and not glaucous; the runners very numerous and stout; the obovate petals scarcely exceeding the sepals; fruit large, the achenes in pits. In the Colorado mountains; at higher elevations than the preceding.

7. ARGENTINA

Perennial, the leaves interruptedly pinnate; spreading by runners; the solitary flowers on long peduncles from the axils of the leaves; petals sub-orbicular; stamens 20-25; styles lateral, slender; the achenes glabrous.

1. **Argentina Anserina** (L.) Rydb. (SILVER-WEED). Leaflets 7-21, green and glabrate above, silvery-silky beneath; from oblong to obovate, sharply serrate; the stipules membranous.

8. POTENTILLA (CINQUEFOIL. POTENTILLA)

Herbs with compound leaves, solitary or clustered flowers, flat 5-cleft calyx with as many bractlets at the intervals, and numerous achenes in a head with the styles not persisting as a tail. (See *Plant Relations*, p. 79, Fig. 72; also *Plant Structures*, p. 225, Fig. 205.)

* Leaves pinnate.

1. **Potentilla Plattensis** Nutt. (POTENTILLA OF THE VALLEY). Stems spreading or prostrate, 1-2 dm. long; leaves green, appressed-strigose or glabrate; the stipules large; leaflets 4-7 pairs, obovate, deeply incised; petals obovate, retuse, exceeding the long acuminate sepals which exceed the similar bractlets. Frequent on sandy bottom lands.

2. **Potentilla Coloradoensis** Rydb. (COLORADO POTENTILLA). Silky tomentose throughout; stems several, about 3 dm. high; leaflets interruptedly pinnate, 4-6 pairs; cyme branched; petals obcordate, scarcely longer than the narrow sepals; carpels 10-20. A common species on dry gravelly hills.

** Leaves ternate.

3. **Potentilla Monspeliensis** L. (ROUGH CINQUEFOIL). Stout, erect, hirsute, 2-4 dm. high; leaves ternate, with obovate or lanceolate serrate leaflets; small yellow flowers in a rather close leafy cluster, stamens 15 (rarely 20). Open ground.

*** Leaves palmately 5-foliate.

4. *Potentilla concinna* Rich. (EARLY POTENTILLA). Low, spreading, many stemmed; leaves white tomentose, especially beneath; leaflets 5, obovate, deeply toothed; petals obcordate, exceeding the sepals and bracts. Warm gravelly slopes and plains; early spring.

5. *Potentilla pulcherrima* Lehm. (BEAUTIFUL POTENTILLA). Stems slender, 3-6 dm. high; leaves green and silky-pubescent above, white with tomentum beneath, long petioled except the smaller stem-leaves; leaflets mostly 5, oblanceolate or broader, crenate; the obovate, emarginate petals nearly equaled by the acuminate sepals. Frequent in meadows and grassy valleys.

9. DRYMOCALLIS

Erect, glandular-pubescent or viscid herbs, with pinnate leaves; stamens 25-30; style thickened and glandular below and attached near the base of the achene. Otherwise much as in *Potentilla*.

1. *Drymocallis fissa* (Nutt.) Rydb. Very leafy, stems several, 15-30 cm. high, glandular hairy, viscid in the crowded cyme; leaflets about 4 pairs, orbicular or rhombic, cleft and serrate; petals orbicular, bright yellow, about 1 cm. long. Very abundant in rocky cañons.

2. *Drymocallis arguta* (Pursh) Rydb. Taller and stouter, 3-8 dm. high, brownish hairy, clammy above; leaflets 7-11, oval or ovate, serrate, downy beneath; flowers white or yellowish, in an upright close cluster; stamens mostly 30. An eastern species extending into the foothills of the Colorado Mountains.

10. GEUM (AVENS)

Herbs with pinnately compound or lyrate leaves, a bell-shaped or flattish 5-cleft calyx, numerous achenes crowded on a prominent receptacle and with the long persistent styles forming hairy or naked tails.

1. *Geum strictum* Ait. (YELLOW AVENS). Hairy-pubescent, erect, rather stout, branched above, 4-10 dm. high; leaflets wedge-ovate, the terminal one large; receptacle of fruit downy; styles bent and jointed near the middle, the upper part deciduous, the lower naked and hooked, becoming elongated. Meadows and margins of copses.

2. *Geum macrophyllum* Willd. (LARGE-LEAVED AVENS). Similar, more bristly hairy; the long root-leaves with terminal leaflets large, suborbicular-cordate, the lateral small or minute; receptacle nearly naked. Moist creek banks and bottom lands.

11. SIEVERSIA (AVENS)

Like *Geum*, but with stem-leaves reduced or bract-like, the styles wholly persistent and not jointed, and the calyx lobes erect instead of reflexed.

1. *Sieversia ciliata* (Pursh) Rydb. (LONG-PLUMED AVENS). Densely soft-pubescent; stems scapose, 1-2 dm. high; leaflets very numerous, small ones interposed among the larger, obovate, cut-toothed leaflets; flowers 3 or more, on long peduncles; calyx and corolla both purplish; styles long and plumose in fruit. Frequent on stony slopes.

2. *Sieversia turbinata* (Rydb.) Greene (ROCKY MOUNTAIN AVENS). Green, slightly pubescent above; leaflets ovate or wedge-shaped, 3-lobed or entire; tube of calyx turbinate; the yellow, sub-orbicular petals exceeding the calyx lobes; styles glabrous. Very abundant on wet slopes in the higher mountains.

12. CERCOCARPUS

A rigid branching shrub, 1-3 m. high; stamens 15-20, in 2 or 3 rows on the limb of the calyx; fruit inclosed in the persistent calyx.

1. *Cercocarpus parvifolius* Nutt. (MOUNTAIN MAHOGANY). Leaves thick, cuneate-obovate, serrate at apex, rather small; somewhat silky above, tomentose beneath; flowers pediceled, the calyx-limb with short teeth; achenes with plumose tails 3-5 cm. long. Abundant on the stony slopes of hills and mountains.

13. ROSA (ROSE)

Shrubby and usually spiny or prickly plants with odd-pinnate leaves and showy flowers, an urn-shaped calyx-tube contracted at the mouth and becoming fleshy in fruit, 5 broad petals inserted with the numerous stamens into the rim of the calyx-tube which bears within and below the numerous hairy pistils, which become bony achenes.

1. *Rosa Sayi* Schwein. (SAY'S ROSE). Low (less than 1 m.), branched, very prickly; leaflets 3-7 (mostly 5), elliptic, obtuse or acutish, obscurely glandular or resinous on the teeth and the under side; sepals erect, acuminate or dilated, entire or few-toothed; flowers large, 5-8 cm. broad, usually solitary-terminal. Frequent on moist wooded slopes.

2. *Rosa Woodii* Lindl. (WOOD'S ROSE). Freely branched, mostly less than 1 m. high; moderately spiny; the spines straight; leaflets 5-9, oval, narrowed at base, somewhat glaucous below; stipules glandular edged and acute; sepals erect in fruit; flowers 3-5 cm. broad. Open grounds; creek banks, etc.

XXX. POMACEÆ (APPLE FAMILY)

Trees or shrubs with the characters of *Rosaceæ*, but with white flowers, 2-5 styles distinct or united at base, an inferior 5-celled ovary, and a fleshy fruit formed by the calyx-tube and ovary (*pome*).

1. *Amelanchier*. Branches not thorny; flowers in corymbs.

2. *Cratægus*. Branches thorny; flowers in racemes.

1. AMELANCHIER (SERVICE-BERRY)

Small shrubs, more rarely becoming tree-like, with 5 narrow reflexed calyx lobes, 5 narrow petals, 5 styles united below and a 5-celled ovary, becoming imperfectly 10-celled; with 1 seed in each cell.

1. *Amelanchier alnifolia* Nutt. (NORTHWESTERN SERVICE-BERRY). Leaves orbicular or oval, very obtuse, coarsely dentate above the middle, pubescent when young; raceme dense, petals white, spatulate or oblong, 12-15 mm. long; fruit 6-8 mm. in diameter, in ripening passing from red to purple, and finally nearly black. Edible.

2. CRATÆGUS (THORN)

Shrubs or usually small freely branched trees, with simple incised and serrate leaves, cup-shaped calyx, 5 rounded petals and numerous stamens, the fruit with 5 bony seeds.

1. **Crataegus rivularis** Nutt. (RIVERSIDE THORN). Spines few, stout, 3-4 cm. long; leaves ovate, serrate, mostly acute at apex and cuneate at base, pubescent or nearly glabrous; corymbs 5-8 flowered, the petals white; fruit black, 10-14 mm. in diameter. Frequent on stream banks.

XXXI. DRUPACEÆ (PLUM FAMILY)

Trees or shrubs with the characters of *Rosaceæ*, but with simple leaves, a single style, and a superior 1-celled ovary becoming a fleshy fruit with a stone (*drupe*).

1. PRUNUS (PLUM. PEACH. CHERRY)

Small trees or shrubs with clusters of flowers, a bell-shaped to tubular 5-cleft calyx, 5 spreading petals, and 15-20 stamens.

1. **Prunus demissa melanocarpa** Aven Nelson (ROCKY MOUNTAIN CHOKE-CHERRY). Generally a small shrub 1-3 m. high, sometimes tree-like; leaves ovate or obovate, abruptly acuminate or merely acute, glabrous or slightly pubescent; the white flowers in dense racemes terminating the branchlets; fruit large (7-9 mm. in diameter), black when mature, juicy and scarcely astringent. Common; moist cañons and slopes.

2. **Prunus americana** Marsh (COMMON WILD PLUM). A thorny shrub or small tree, 2-5 m. high; leaves ovate, conspicuously pointed, coarsely serrate, smooth when mature; flowers usually white; fruit roundish oval, yellow, orange, or red. Woods and river banks.

XXXII. PAPILIONACEÆ (PULSE FAMILY)

Herbs, shrubs, or trees with alternate and usually compound leaves, irregular flowers, 5 sepals more or less united, 5 very dissimilar petals (upper petal or *standard* larger than the others and inclosing them in the bud, turned back or spreading; the two lateral petals or *wings* oblique; the two lower petals coherent by their edges and forming the *keel* which usually incloses the stamens and pistil), usually 10 variously united stamens (mostly 9 united into a tube and the upper one separate), and a 1-celled ovary becoming a more or less elongated pod. (See *Plant Structures*, p. 264, Fig. 250.)

* Leaves trifoliate; stamens 10, distinct; pods long.

1. **Thermopsis**. Stipules conspicuous; flowers yellow, in racemes.

** Leaves digitately 5-11 foliate; stamens 10, monadelphous; pods large.

2. **Lupinus**. Calyx 2-lipped; anthers of 2 forms.

*** Leaves trifoliate; stamens 10, diadelphous; anthers all alike; pods small.

3. **Medicago**. Flowers in racemes; pods curved or coiled.

4. **Melilotus**. Flowers in racemes; pods with thick wrinkled walls.

5. **Trifolium**. Flowers in heads ; pods membranaceous.
 * * * * Leaves unequally pinnate ; stamens 5, monadelphous.
6. **Petalostemon**. Flowers in dense spikes ; pods 1 or 2 seeded.
 * * * * Leaves unequally pinnate ; stamens 10, diadelphous.
7. **Glycyrrhiza**. Foliage glandular-punctate ; flowers in dense spikes ; pod 1-celled, covered with hooked prickles.
8. **Astragalus**. Foliage not punctate ; keel of corolla blunt ; pod fleshy, leathery or membranous, 2-celled, only partially so, or 1-celled.
9. **Aragallus**. Much like *Astragalus*, except that the keel of the corolla is acute or tipped with a point.
 * * * * Leaves evenly pinnate, with tendrils ; stamens diadelphous.
10. **Vicia**. Style filiform, a tuft of hair at the summit.
11. **Lathyrus**. Style flattened, hairy down the inside.

1. THERMOPSIS (THERMOPSIS)

Stout perennial herbs with clustered stems from rhizomes, large free stipules and entire leaflets, campanulate calyx cleft to the middle, the standard shorter than the wings and the straight keel, and with narrow flattened pods.

1. **Thermopsis montana** Nutt. (MOUNTAIN THERMOPSIS). Erect, 4-7 dm. high ; leaflets oblong, silky-pubescent becoming glabrate ; the stipules exceeding the petioles ; pod softly cinerous-pubescent, erect, 4-6 cm. long, about 6 mm. broad, 10-12 seeded. Open woods and copses.

2. **Thermopsis divaricarpa** Aven Nelson (RIVER-BANK THERMOPSIS). Leaflets elliptic or obovate ; nearly glabrous ; the large stipules ovate, somewhat inequilateral, longer than the petiole ; pods pubescent when young, at length glabrous, 8-10 cm. long, about 7 mm. broad, slightly curved and becoming widely divaricate. Wet banks and bottom lands.

3. **Thermopsis arenosa** Aven Nelson (SAND-DUNE THERMOPSIS). Smaller, 2-4 dm. high, branching ; leaflets oblanceolate to obovate ; stipules ovate to sub-orbicular ; pod stipitate, divaricate from the first, sometimes drooping, slightly curved, constricted between the few large seeds. Dry sandy ravines and dunes in the foothills.

2. LUPINUS (LUPINE)

Perennial herbs with palmately 5-15 foliolate leaves, showy flowers in terminal racemes, a deeply 2-lipped calyx, a scythe-shaped pointed keel, and an oblong flattened pod.

1. **Lupinus Plattensis** Wats. (NEBRASKA LUPINE). Simple stemmed ; appressed silky-villous except on the upper face of the 7-10 spatulate leaflets ; raceme terminal ; corolla blue, with a conspicuous dark spot on the standard ; ovules 5-8. Sandy plains and ridges.

2. **Lupinus humicola** Aven Nelson (WYOMING LUPINE). Stems simple, numerous, in dense tufts, with crowded, long-petioled root-leaves ; finely appressed-pubescent throughout ; leaflets 7-12, oblanceolate, acute ; raceme terminal ; flowers blue ; pods villous-pubescent, about 6-seeded. Early spring ; in moist copses and wet cañons.

3. **Lupinus argenteus** Pursh. (SILVERY LUPINE). Bushy-branched, 3-5 dm. high, appressed-silvery-pubescent, leaflets 5-8, linear-lanceolate ; racemes terminating the branches ; flowers purple ; pods silky, 3-5 seeded. Open plains, banks of ravines, etc.

3. **MEDICAGO** (MEDICK)

Herbs with pinnately 3-foliate leaves, toothed leaflets, flowers nearly as in *Melilotus*, but the pod curved or variously coiled.

1. **Medicago sativa** L. (LUCERNE. ALFALFA). Upright and smooth; leaflets obovate-oblong, toothed; purple flowers in racemes; pods spirally twisted. Cultivated for fodder; from Europe.

4. **MELILOTUS** (SWEET CLOVER)

Herbs (fragrant in drying) with pinnately 3-foliate leaves, toothed leaflets, flowers much as in *Trifolium* but in long racemes, and ovoid tough and wrinkled pods.

1. **Melilotus officinalis** (L.) Lam. (YELLOW MELILOT). Upright, 2-4 ft. high; leaflets obovate-oblong, obtuse; flowers yellow. Waste or cultivated ground; from Europe.

2. **Melilotus alba** Desv. (WHITE MELILOT). Leaves truncate; flowers white. Waste or cultivated ground; from Europe.

5. **TRIFOLIUM** (CLOVER)

Tufted or spreading herbs with palmately 3-foliate leaves, usually toothed leaflets, small flowers in heads or spikes, a 5-cleft calyx with bristle-like teeth, a short and obtuse keel, and a small membranous pod.

* Introduced; in cultivation and escaped along roadsides and ditch-banks.

1. **Trifolium pratense** L. (RED CLOVER). Stems ascending, somewhat hairy; leaflets oval or obovate, often notched at tip and with a pale spot above; rose-purple flowers sessile in dense ovate heads, the corolla elongated-tubular. Meadows and largely cultivated; from Europe.

2. **Trifolium repens** L. (WHITE CLOVER). Stems slender, smooth, spreading and creeping; leaflets inversely heart-shaped or only notched, obscurely toothed; flowers on stalks in small and loose umbel-like heads, reflexed when old; calyx much shorter than the white corolla. Fields, lawns, and roadsides.

** Native.

3. **Trifolium scariosum** Aven Nelson (ROCK CLOVER). Low, densely caespitose, silvery or cinerously canescent, nearly stemless; leaflets linear-oblong, tapering to both ends; stipules scarious; involucre of several, unequal, scarious green-ribbed segments; calyx purplish, with unequal, linear teeth; corolla uniformly purple; styles as long as the few-seeded pod. Occurring mostly on naked stony slopes and in rocky ravines.

4. **Trifolium Parryi** Gray (PARRY'S CLOVER). Low, glabrous and stoutish; leaflets oblong-oblancoelate, sharply dentate; bracts 5-7, oblong, obtuse; flowers purple, 20 or more in a rather large head. In open coniferous woods at sub-alpine stations.

6. **PETALOSTEMON** (PRAIRIE-CLOVER)

Perennial herbs, sometimes with woody base; leaves glandular-punctate and the flowers spicate. Calyx teeth nearly equal; petals clawed, the cordate standard free, the claw of the wing and keel petals attached to the stamen tube.

1. **Petalostemon oligophyllus** (Torr.) Rydb. (SLENDER PRAIRIE-CLOVER). Stems several from the woody caudex, spreading, 2-4 cm. long; leaflets 5-9, nearly

glabrous, linear-oblong or oblanceolate; spikes short-cylindric, dense; flowers white. Frequent; on dry hills.

2. **Petalostemon purpureus** (Vent.) Rydb. (VIOLET PRAIRIE-CLOVER). Leaflets linear, glabrous, 3-5; spikes very dense, oblong or cylindric; corolla violet or purple.

7. GLYCYRRHIZA (LIQUORICE)

Erect, perennial herbs, from large sweet roots; the flowers in peduncled, axillary dense spikes, with anthers of two sizes, and ovary sessile with short rigid style.

1. **Glycyrrhiza lepidota** Pursh (WILD LIQUORICE). Glandular-pubescent; 4-8 dm. high; leaflets 13-17, mostly lanceolate, entire; spikes dense; the peduncles shorter than the leaves; flowers yellowish-white; pod 12-15 mm. long, few-seeded, closely beset with hooked prickles. On creek banks and in moist draws.

8. ASTRAGALUS (MILK VETCH)

Herbs with odd-pinnate or rarely simple stipulate leaves, flowers in racemes or spikes, calyx tubular with equal teeth, clawed petals and a dehiscent or indehiscent pod.

* Flowers white or yellowish (rarely purple) § 1, 2, 5, and 6.

** Flowers blue, violet or purple § 3, 4, 7, 8, and 9.

§ 1. Stems prostrate; leaflets 15-25; flowers yellowish or purple; pod thick-walled and fleshy, 2-celled.

1. **Astragalus prunifer** Rydb. (PLUM-BEARING VETCH). The depressed leafy stems 2-3 dm. long, somewhat strigose, as are also the leaves; leaflets 17-25; spike short, peduncled; flowers yellowish, the keel purple-tipped; pod plum-shaped, 2 cm. long. Saline plains and slopes. Wyoming and northward.

2. **Astragalus crassicaarpus** Nutt. (GROUND PLUM). Similar, but with purple flowers and broader leaves. Colorado and eastward.

§ 2. Tall; leaflets 15-27; flowers yellowish; pod leathery, 2-celled, oblong, terete.

3. **Astragalus Carolinianus** L. (CAROLINA MILK-VETCH). Erect, 4-8 dm. high, glabrous or nearly so; flowers in dense spikes; pod sessile, acute, 12-15 mm. long, indehiscent. Common; on wet banks

§ 3. Bushy-branched; leaflets 19-25; flowers violet-purple; pod glabrous and grooved at both sutures, 2-celled.

4. **Astragalus mollissimus** Torr. (WOOLLY LOCO-WEED). Densely pubescent, with long soft hairs, 3-4 dm. high; the stem proper short; the peduncles long and scape-like; flowers in dense spikes. The commonest of the Colorado "Locoweeds."

§ 4. Low, spreading or assurgent; leaflets 15-25; flowers purplish or violet; pod pubescent, 2-celled.

5. **Astragalus adsurgens** Pall. (ASCENDING MILK-VETCH). Tufted, the numerous stems decumbent at base with ascending tips; leaflets oblong, cinnereous; spikes dense, capitate or cylindric; pod leathery, grooved dorsally, 10-12 mm. long.

6. **Astragalus hypoglottis** L. (PURPLE MILK-VETCH). Low, spreading, branched; leaflets elliptic; flowers capitate; pod membranous, densely white-hairy.

§ 5. Acaulescent; leaflets 11-17; flowers white or yellowish; pod densely white-woolly, 1-celled.

7. **Astragalus Purshii** Dougl. (PURSH'S MILK-VETCH). Silvery or white, with dense woolly hairs; leaflets oblong; keel purple-tipped; pod elliptic, 10-14 mm. long.

§ 6. Erect or ascending; leaflets 11-31; flowers ochroleucus; pod glabrous, 1-celled.

8. **Astragalus Drummondii** Dougl. (DRUMMOND'S MILK-VETCH). Stout, erect, 3-5 dm. high, woolly pubescent throughout; leaflets 17-31, oblong; pod distinctly stipitate, linear, furrowed dorsally, pendent. Frequent on warm sandy slopes.

9. **Astragalus pectinatus** (Hook.) Dougl. (NARROW-LEAVED MILK-VETCH). Nearly glabrous, erect or ascending 2-4 dm. high; leaflets 11-19, narrowly linear, 2-5 cm. long; pod terete, sessile. Sandy plains; common.

§ 7. Stems tufted, tall; leaflets 15-25; flowers purple; pod 2-grooved dorsally, at length glabrous.

10. **Astragalus bisulcatus** (Hook.) Gray (TWO-GROOVED MILK-VETCH). Puberulent, 3-7 dm. high, mostly in dense clumps; leaflets oblong; flowers in long racemes, on peduncles surpassing the leaves; pod stipitate, drooping, membranous. Alkaline plains; common.

§ 8. Nearly acaulescent, spreading; leaflets 7-23; flowers blue, violet or purple; pod terete or flattened, 1-celled.

11. **Astragalus Missouriensis** Nutt. (MISSOURI MILK-VETCH). Silvery-silky, tufted; the stems short and prostrate; leaflets 9-17, oblong or elliptic, 10-12 mm. long; flowers purple; pod oblong-lanceolate, coriaceous, transversely rugose, nearly straight; 2-3 cm. long. Open plains.

12. **Astragalus Shortianus** Nutt. (SHORT'S MILK-VETCH). Very similar, leaflets 9-13, elliptic to broadly obovate; flowers blue or violet; pod ovate-lanceolate, strongly curved at apex. When not in fruit may be distinguished from the preceding by the broader, less canescent, thick leaves, the less tufted habit and the deep-blue flowers. Sandy draws and ridges.

13. **Astragalus alpinus** L. (ALPINE MILK-VETCH). Nearly glabrous; stems spreading-assurgent; leaflets 11-23, thin, oval, obtuse, often notched; flowers from nearly white to violet, on long peduncles; pod membranous, stipitate, black-pubescent. Stony valleys in the mountains.

§ 9. Caespitose; leaflets simple or 3-5-foliate; flowers purple; pod small, 1-celled, coriaceous.

14. **Astragalus spatulatus** Sheld. (TUFTED MILK-VETCH). Forming broad, low, densely silvery canescent mats, which become almost hidden by the small crowded purple flowers; leaves simple or 3-5 pinnate, narrowly linear-spatulate, 2-4 cm. long; raceme elongated in fruit; the pod few-seeded.

15. **Astragalus sericoleucus** Gray (HOARY MILK-VETCH). Similarly tufted, silky-pubescent; leaves trifoliate; the leaflets oblong, 6-12 mm. long; peduncles few-flowered (2-6); pod ovoid, acute.

9. ARAGALLUS (Loco)

Tufted perennials with many of the characters of *Astragalus*, leaves mostly basal and the strict stems scape-like.

1. ***Aragallus splendens*** (Dougl.) Greene (SHOWY LOCO). Densely silvery-woolly, stemless; leaves long, crowded on the crown, tufted-spreading; leaflets numerous, in whorls of 3-6; peduncles longer than the leaves (2-3 dm.); flowers deep purple, in dense bracteate spikes, pod pubescent, 2-celled, long-acuminate. Frequent in grassy mountain-valleys.

2. ***Aragallus multiceps*** (Nutt.) Heller. (TUFTED LOCO). Silky-hairy, low and matted; leaflets 7-11, oblong; peduncles 1-3-flowered; pod 1-celled, ovate, somewhat turgid, wholly inclosed in the enlarged, bladdery, sub-globose calyx. Frequent on gravelly banks and slopes.

3. ***Aragallus Lamberti*** (Pursh) Greene (LAMBERT'S LOCO). Stems singly or in small tufts, erect, as are also the rather few leaves; leaves basal, with 9-17 lanceolate leaflets; flowers purple, in a short spike; pod terete, half 2-celled, taper-pointed, considerably longer than the calyx. This plant is the one oftenest referred to by the term "Loco." Plains and gravelly slopes.

4. ***Aragallus saximontanus*** Aven Nelson (ROCKY MOUNTAIN LOCO). Mostly in large dense tufts of crowded leaves and scapes, somewhat grayish-pubescent; scapes stout, erect, surpassing the leaves; flowers white, varying to a cream-yellow, keel often tipped with purple; pod oblong, with a straight tip. Frequent on denuded hills and gravelly plains.

10. VICIA (VETCH)

Herbaceous, often climbing and vine-like, with pinnate, tendril-bearing leaves, half-sagittate stipules, racemose purple flowers and stigma pubescent at the tip.

1. ***Vicia Americana*** Muhl. (AMERICAN VETCH). A stoutish climber; leaflets 6-14, ovate or oblong; flowers 4-8 on each peduncle; pod stipitate, glabrous, oblong, few-seeded. Moist open copses.

2. ***Vicia linearis*** (Nutt.) Greene (NARROW-LEAVED VETCH). Lower, scarcely climbing; leaflets linear, 6-12, 2-3 cm. long, otherwise much like the preceding. Often on open ground.

11. LATHYRUS (PEA)

Much like *Vicia*, except that the style is flattened and pubescent down the inside; not climbing.

1. ***Lathyrus decaphyllus*** Pursh (WILD SWEET-PEA). Somewhat branched, 3-5 dm. high, nearly glabrous or even glaucous; leaflets 6-12, thick and strongly nerved, narrowly oblong; flowers very large (2-3 cm. long), purple; pod broadly linear.

2. ***Lathyrus ornatus*** Nutt. (SHOWY WILD-PEA). Similar, but smaller in every way; leaflets linear and pod relatively broader, the peduncle few-flowered (2-5). Sandy plains and draws.

3. ***Lathyrus ornatus incanus*** Smith and Rydb. Like the species but very white, with a short, dense, woolly pubescence.

XXXIII. GERANIACEÆ (GERANIUM FAMILY)

Herbs with lobed or divided leaves, 5 sepals, 5 petals, 10 stamens, and a deeply lobed ovary whose 5 carpels separate elastically from the elongated axis when mature.

1. GERANIUM (GERANIUM)

Perennial herbs with forking stems, swollen nodes, mostly opposite palmately lobed leaves, scarious stipules and 1-3 flowered peduncles.

1. *Geranium Fremontii* Torr. (FREMONT'S GERANIUM). Tufted, closely glandular-puberulent and sparsely pilose; stems few, somewhat branched, stoutish, 3-5 dm. high; leaves 3-7 cleft, the segments lobed or cleft; petals light-purple. Frequent on partially wooded, stony slopes.

2. *Geranium cespitosum* James (TUFTED GERANIUM). Many-stemmed from the broad, matted base, slender, only 2-3 dm. high; leaves smaller, deeply 5-7 cleft, pubescent but not glandular; flowers purple. Sandy banks and ravines.

3. *Geranium Richardsoni* Fisch. & Mey. (RICHARDSON'S GERANIUM). Not tufted, tall and slender, with fine appressed pubescence, glandular only on the pedicels; leaves cleft nearly to the base, the segments incisely toothed; flowers white or purplish. Moist woods along streams.

XXXIV. LINACEÆ (FLAX FAMILY)

Perennial herbs with regular 5-merous flowers, imbricated calyx and convolute petals, stamens monadelphous at base, and a 10-seeded, 10-celled pod.

1. LINUM (FLAX)

Herbs with woody base, alternate, sessile leaves and cymose flowers, globose pods and flattened seeds.

1. *Linum Lewisii* Pursh (LEWIS'S WILD FLAX). Stems simple, slender, virgate; leaves linear; corolla blue, 2-3 cm. broad; petals ephemeral.

XXXV. EUPHORBIACEÆ (SPURGE FAMILY)

Herbs with alternate simple leaves, milky, acrid juice, monœcious or diœcious flowers (usually apetalous), a 3-celled and 3-seeded ovary.

1. EUPHORBIA (SPURGE)

Monœcious; the flowers in a cup-shaped involucre which bears a gland in each sinus; staminate flowers numerous, borne on the wall of the cup, each of a single stamen; pistillate flowers solitary, pedicelled and soon exserted; ovary and capsule 3-lobed.

1. **Euphorbia marginata** Pursh ("SNOW-ON-THE-MOUNTAIN"). Stout, erect, hairy, 3-6 dm. high; leaves ovate, oblong or obovate; the floral leaves (bracts) large, white-margined (petal-like); inflorescence umbel-like; involucre bell-shaped, 5-lobed, the alternating glands with white reniform appendages; capsule subglobose. Frequent on sandy plains.

2. **Euphorbia robusta** (Engelm.) Small (ROCKY MOUNTAIN SPURGE). Smooth and glaucous, the numerous erect stems tufted; leaves ovate to oblong, 1-2 cm. long; inflorescence an umbel; involucre campanulate, the glands naked; pod globose, nodding; the seeds with shallow pits. Frequent on stony, sandy ridges and slopes.

3. **Euphorbia petaloidea** Engelm. (WHITE-FLOWERED SPURGE). Low, slender branched, spreading or prostrate; leaves opposite, mostly oblong, 1-2 cm. long, entire; involucre bell-shaped, 4-lobed; glands with conspicuous white petaloid appendages; the ash-colored seeds nearly smooth. Very abundant on warm sandy slopes.

XXXVI. OXALIDACEÆ (SORREL FAMILY)

Herbs with alternate or basal 3-foliolate leaves, regular flowers, 5 sepals, 5 petals, 10 stamens usually united at base, 5 styles and a 5-celled ovary becoming a 5-lobed pod.

1. OXALIS (WOOD-SORREL)

Herbs with sour juice, and inversely heart-shaped leaflets (closing and drooping at night). -

1. **Oxalis stricta** L. (YELLOW WOOD-SORREL). Smooth or hairy, from running rootstocks; stems leafy, branching, bearing axillary flower-stalks longer than the leaves and with 2-6 yellow flowers.

XXXVII. ACERACEÆ (MAPLE FAMILY)

Trees with opposite simple or compound leaves, small regular flowers, usually a 5-lobed colored calyx, petals often none, 3-12 stamens, 2 long styles, and a 2-lobed ovary ripening into a pair of winged fruits.

1. ACER (MAPLE)

Trees with palmately lobed leaves. (See *Plant Relations*, p. 26, Fig. 20; also p. 115, Fig. 116. Also *Plant Structures*, p. 212, Fig. 186.)

1. **Acer saccharinum** L. (WHITE OR SILVER MAPLE). Ornamental tree; leaves very deeply 5-lobed, with rather acute sinuses, silvery-white underneath, the divisions narrow, cut-lobed and toothed; flowers in lateral umbel-like clusters on short stalks, much preceding the leaves; stamens 3-6; fruit with large divergent wings. Freely planted in parks and home grounds.

2. **Acer glabrum** Torr. (ROCKY MOUNTAIN MAPLE). Generally a shrub in small clumps, or singly and tree-like; leaves 3-lobed or 3-parted, the segments

sharply toothed or incised; flowers in an umbel-like corymb, sepals and petals light green, sub-equal; the petals spatulate; stamens 8; winged fruit 2-3 cm. long. Frequent in cañons.

3. **Acer Negundo** L. (BOX ELDER). A low, widely branched tree; the leaves 3-5-foliate, with ovate toothed strongly-veined leaflets which are pubescent when young, glabrate in age; flowers small, green, dioecious, drooping; the staminate in close clusters; the pistillate in racemes; wings broad and incurved.

XXXVIII. VITACEÆ (VINE FAMILY)

Shrubs usually climbing by tendrils, with alternate simple or compound palmate leaves, small flowers, minute calyx, 4 or 5 petals with as many stamens opposite them, a 2-celled ovary, and fruit a berry, usually 4-seeded.

1. **Vitis**. Plants climbing by the coiling of naked-tipped tendrils; leaves simple.

2. **Parthenocissus**. Plants climbing by sucker-like disks at the tips of tendrils; leaves palmately compound.

1. VITIS (GRAPE)

Shrubs climbing by the coiling of naked tendrils, with simple rounded and heart-shaped leaves, very fragrant clusters of flowers, with petals falling off without opening, and a short style or none.

1. **Vitis vulpina** L. (RIVERSIDE GRAPE). Glabrous; climbing over bushes and rocky ledges; leaves thin, with 3-7 acute lobes; panicles rather crowded; fruit black with bloom, 6-8 mm. in diameter.

2. PARTHENOCISSUS

Shrubs climbing by tendrils fixing themselves by sucker-like disks at the tips, with palmately compound leaves, and thick petals expanding before they fall.

Parthenocissus quinquefolia (L.) Planch. (VIRGINIA CREEPER. WOOD-BINE). Climbing extensively; leaflets 5, lance-oblong, cut-toothed, changing to crimson in autumn; berries small, black or bluish. Low or rich ground. (See *Plant Relations*, p. 63, Figs. 53, 54.)

XXXIX. MALVACEÆ (MALLOW FAMILY)

Herbs or shrubs with alternate leaves, 5 sepals united at base, 5 petals, numerous stamens united into a column, and numerous ovaries united into a ring or forming a several-celled pod.

1. **Malva**. Flowers with a 3-leaved involucre at base; petals whitish, fruit a ring of blunt carpels; stigma lateral.

2. **Malvastrum**. Flowers with 1-3-leaved involucre or none; petals pinkish-red; fruit separating into beaked carpels; stigma capitate, terminal.

1. MALVA (MALLOW)

Low herbs with a 3-leaved involucre at base of calyx like an outer calyx, inversely heart-shaped petals, and numerous ovaries united into a ring around a central axis and forming a flattened fruit which separates at maturity into as many kidney-shaped blunt carpels.

1. **Malva rotundifolia** L. (COMMON MALLOW). Stems procumbent; leaves round heart-shaped on very long petioles, crenate, obscurely lobed; petals whitish, twice the length of the calyx; carpels hairy. Roadsides and cultivated grounds.

2. MALVASTRUM (FALSE MALLOW)

Herbaceous, somewhat tufted perennials with racemose flowers and 10-15 rugose-reticulated carpels.

1. **Malvastrum coccineum** (Pursh) Gray (RED FALSE MALLOW). Low and branched, 1-2 dm. high; cinerous, with stellate-pubescent; leaves pedately lobed, the segments toothed or incised; flowers in dense terminal racemes, conspicuous, 15-20 mm. broad; carpels rugose. Common on the plains everywhere.

XL. VIOLACEÆ (VIOLET)

Herbs with leaves all basal or alternate and with stipules, axillary nodding flowers, 5 sepals, an irregular 1-spurred corolla of 5 petals, 5 stamens conniving over the pistil, a single style, and a 1-celled ovary becoming a pod which splits into 3 divisions.

1. VIOLA (VIOLET)

Herbs with sepals extended into ears at base, the lower petal spurred at base, the 2 lower stamens bearing spurs which project into the spur of the corolla, and a club-shaped style. (See *Plant Relations*, p. 117, Fig. 121; also *Plant Structures* p. 229, Fig. 211.)

* Flowers yellow, more or less purple veined, sub-acaulescent.

1. **Viola Nuttallii** Pursh (NUTTALL'S VIOLET). Nearly stemless and glabrous; leaves spreading, lanceolate, obscurely repand or crenate, 4-8 cm. long, tapering into a petiole as long as the blade; peduncles shorter than the leaves; sepals lance-acuminate, the yellow corolla rather small. Frequent on the open sandy plains.

2. **Viola vallicola** Aven Nelson (VIOLET OF THE VALLEY). Similar, but stem evident, glabrous or puberulent; roots fascicled, fibrous-fleshy; leaves entire, from broadly to narrowly ovate, with rounded or even sub-cordate base, obtuse apex, the petiole equalling or longer than the blade; the yellow flowers larger. Moist fertile mountain valleys.

** Flowers not yellow, leafy stemmed or stemless.

3. **Viola Canadensis** L. (CANADA VIOLET). Upright, 1-3 dm. high; leaves heart-shaped, pointed, serrate; stipules entire; flowers white or whitish inside, the upper petals mostly tinged with purple beneath, the lateral ones bearded. Rich woods.

4. *Viola cognata* Greene (MOUNTAIN MEADOW VIOLET). Glabrous, stemless; the leaves from reniform to round-cordate, crenate, very obtuse, 1-18 mm. broad, long petioled; peduncles usually longer than the leaves; corollas large, light blue, the petals villous at base. Wet mountain meadows.

*** Flowers variously colored; leafy stemmed and with large foliar pinnatifid stipules.

5. *Viola tricolor* L. (PANSY). Stem angled and branched, leafy throughout; leaves roundish or the upper oval and the lower heart-shaped, crenate or entire; flowers variable in color or variegated (yellow, white, violet-blue, purple, etc.). Cultivated from Europe.

XLI. LOASACEÆ (LOASA FAMILY)

Herbs, rough with hooked or stinging hairs, no stipules, regular flowers, with 5 or 10 petals inserted with the stamens on the throat of the adnate calyx-tube, many stamens, a 1-celled capsule with parietal placentæ.

1. *Mentzelia*. Flowers small, yellow; petals 5; seeds not winged.

2. *Hesperaster*. Flowers large, white; petals 10; seeds winged.

1. MENTZELIA (MENTZELIA)

Brittle annuals with rough adhesive leaves; obconic or terete, 5-lobed calyx tube; numerous filiform filaments, truncate ovary, and oblong or irregularly angled seeds.

1. *Mentzelia albicaulis* (Hook.) Dougl. (WHITE-STEMMED MENTZELIA). A slender annual 1-4 dm. high, branched; stems light, becoming white and glistening; leaves pinnatifid with narrow lobes; petals spatulate or broader; capsule clavate; the seeds irregularly angled, tuberculate. Frequent on dry loose banks and slopes.

2. *Mentzelia integrifolia* (Wats.) Rydb. Quite similar, but the leaves from entire to sinuate-toothed, from narrowly oblong to ovate; seeds nearly cubical and not tuberculate.

2. HESPERASTER (WESTERN STAR)

Stout, erect, more or less branched biennials or perennials, hooked pubescence, pinnatifid leaves, large flowers with 10 petals or fewer, very numerous stamens and winged seeds.

1. *Hesperaster decapetalus* (Sims) T. D. A. C. (SHOWY WESTERN STAR). Roughish pubescent, 3-7 dm. high; leaves from ovate to lanceolate, sinuate-pinnatifid; flowers very large, 7-10 cm. across; petals 10, white; stamens exceedingly numerous, all filiform; capsule large, bracted at base; the seeds winged. Flowers opening at sunset.

2. *Hesperaster nuda* (Pursh) T. D. A. C. (BRACKETLESS EVENING STAR). Somewhat similar but smaller, moderately branched; the leaves lanceolate, with obtuse segments; flowers bracted at base, 4-6 cm. broad, the outer stamens sterile and petal-like; capsule nearly cylindric, 3-valved at summit; the seeds winged. Frequent on sterile denuded hills.

XLII. CACTACEÆ (CACTUS FAMILY)

Green, thickened-fleshy, spiny and mostly leafless plants which in outline are globular cylindric or flattened; the flowers of numerous sepals, petals and stamens which cohere by their bases and form a tube or cup above the many ovuled inferior ovary.

1. **Echinocereus**. Stems globular-ovate or oblong, ribbed; the spines on the ribs and the flowers just above the bristle-bearing cushions (areolæ); flowers green.

2. **Echinocactus**. Stems globose, with tubercles (in spiral rows) bearing spines in apical areolæ; flowers greenish-pink, borne close to the areolæ.

3. **Cactus**. Stems globose to oblong, with spine-bearing tubercles; flowers borne between the tubercles.

4. **Opuntia**. Stems jointed; the joints flat or sub-cylindric; flowers yellow.

1. ECHINOCEREUS (CEREUS)

Stems singly or clustered, ribs 13, vertical; calyx-tube also spine bearing.

1. **Echinocereus viridiflorus** Engelm. (GREEN-FLOWERED CEREUS). Mostly less than 1 dm. high; spines radiating, 12-18, with 2-6 superior setaceous ones; the lower brown, the others white or purplish; seeds tubercled. Plains.

2. ECHINOCACTUS

Stems singly or clustered; rows of tubercles 8-13; calyx-tube covered with sepal-like scales, passing into the sepals and the sepals into the petals.

1. **Echinocactus Simpsoni** Engelm. (SIMPSON'S CACTUS). Outer spines 20-30, whitish; the inner 8-10, stouter and darker; seeds black, tuberculate. Frequent in valleys and on rocky slopes.

3. CACTUS (CACTUS)

Stems oval to oblong or in some species columnar; the tubercles cylindric, woolly and spiny at summit; the flowers from areolæ at the base of the tubercles.

1. **Cactus viviparus** Nutt. (PURPLE CACTUS). Tubercles slightly grooved, with 3-8 reddish-brown and 12-25 shorter white spines; flowers purple, 3-4 cm. long; ovary naked; seeds brown, pitted. Plains and prairies.

4. OPUNTIA (PRICKLY PEAR)

Stems jointed and branching; flowers lateral, with many petals and very numerous stamens; fruit pear-shaped.

1. **Opuntia polyacantha** Haw. (MANY-SPINED OPUNTIA). Prostrate-spreading, the joints oval or obovate, variable in size; flowers large, 4-6 cm. broad; fruit dry and prickly. Abundant; exceedingly variable.

2. **Opuntia fragilis** (Nutt.) Haw. (BRITTLE OPUNTIA). Usually in broad dense beds; the stems prostrate, of many small ovate, sub-terete joints; flowers yellow, much smaller than in the preceding, rarely produced—the plant spreading from the joints, which become broken off and scattered and then rooting.

XLIII. **ELEAGNACEÆ** (OLEASTER FAMILY)

Shrubs or small trees; the entire leaves and the twigs silvery or brownish, with scales or stellate hairs; flowers small, clustered in the axils, perfect or dioecious; the base of the perianth inclosing a 1-celled ovary; stamens 4 or 8; fruit drupe-like.

1. **LEPARGYREA** (BUFFALO BERRY)

Flowers dioecious; the staminate 4-parted, with spreading lobes and 8 stamens; the pistillate with a short terete perianth with 4 erect lobes; the drupe-like fruit (berry) with a smooth flattened seed.

1. **Lepargyrea argentea** (Nutt.) Greene (BUFFALO BERRY. BULL BERRY). A rather thorny shrub or small tree, with entire, silvery, oblong, obtuse leaves; the edible berry in small nearly sessile clusters, decidedly acid and ovoid in shape. Often forming dense copses on stream banks.

2. **Lepargyrea Canadensis** (L.) Greene (CANADIAN BUFFALO BERRY). A small thornless shrub with ovate leaves, which are green and sparingly stellate-scurfy above, as are also the twigs, silvery-scurfy beneath; flowers yellowish; fruit ovoid, yellowish-red, decidedly bitter; inedible. Frequent on wooded slopes.

XLIV. **ONAGRACEÆ** (EVENING PRIMROSE FAMILY)

Herbs with 4-parted regular flowers, tubular calyx, 8 stamens, a single style, and an inferior 2-4-celled ovary becoming a capsule or indehiscent nut.

* Fruit an elongated capsule opening by valves; seeds comose.

1. **Chamænerion**. Calyx-tube not prolonged beyond the ovary.

2. **Epilobium**. Calyx-tube prolonged beyond the ovary.

** Fruit a capsule opening by valves; seeds not comose.

+ Stamens equal in length; flowers yellow.

3. **Onagra**. Stigma cleft into 4 linear segments; buds erect.

4. **Galpinsia**. Stigma disk-shaped; calyx-tube much longer than the ovary.

5. **Meriolix**. Stigma disk-shaped; calyx-tube much shorter than the ovary.

6. **Chylisma**. Stigma capitate; capsule pedicelled, linear-clavate.

+ + Stamens equal in length; flowers white, changing to rose or pink.

7. **Anogra**. Stigma cleft into 4 linear segments; buds drooping.

+ + + Stamens unequal in length; ovules and seeds few.

8. **Pachylophus**. Flowers white, fading pink; capsule obtusely 4-angled.

9. **Lavauxia**. Flowers white or yellow, fading purple; capsule sharply 4-angled.

*** Fruit indehiscent, nut-like, few-seeded.

10. **Gaura**. Petals clawed, unequal; stigma 4-lobed, fruit terete, narrowed and 4-sided above.

1. **CHAMÆNERION** (WILLOW HERB)

Herbs with nearly sessile leaves, purple or white flowers, calyx-tube not prolonged beyond the ovary, and capsule containing numerous silky-tufted seeds. (See *Plant Relations*, p. 112, Fig. 111; p. 113, Fig. 112; p. 128, Fig. 134. Also *Plant Structures*, p. 212, Fig. 185.)

Chamænerion (Epilobium) angustifolium (L.) Scop. (FIRE-WEED). Stem simple, tall, 7-12 dm. high; leaves scattered, numerous and large, lanceolate, nearly entire; flowers large, purple, in a long raceme. In the mountains, in newly cleared or burned ground.

2. **EPILOBIUM** (WILLOW HERB)

Closely resembling *Chamænerion*; the stigma clavate or more rarely 4-lobed (not cleft); calyx-tube prolonged beyond the ovary, the capsule long and slender, 4-sided.

1. **Epilobium adenocaulon** Haussk. (NORTHERN WILLOW HERB). Stem moderately branched, 4-8 dm. high, glandular-pubescent in the inflorescence; leaves narrowly ovate to lanceolate, usually more or less serrate; buds at first nodding; the petals notched, purplish or merely tinged with pink; seeds ellipsoidal, with a short beak and white coma. Frequent; in wet places, creek banks, spring bogs, etc.

2. **Epilobium paniculatum** Nutt. (PANICLED WILLOW HERB). Slender annual, paniculately branched above and glandular-pubescent; leaves linear or nearly so; calyx-tube shorter than its lobes; petals cuneate notched; capsule fusiform; the seeds black. Dry banks and open copses.

3. **ONAGRA** (EVENING PRIMROSE)

Stoutish erect herbs, nearly simple, with alternate leaves, yellow nocturnal flowers, elongated calyx-tube, 4-celled ovary and 4-angled capsule.

1. **Onagra strigosa** Rydb. (EVENING PRIMROSE). Grayish, with a short stiff pubescence; leaves obovate or oblanceolate below, becoming lanceolate upward; flowers in a leafy-bracted spike; calyx-segments with free tips; capsule 2-3 cm. long. Sandy stream-banks.

4. **GALPINSIA** (PRIMROSE)

Perennial herbs, often with woody base freely branched, elongated slender calyx-tube, broad yellow corolla, elongated capsule narrowed at base and more or less curved.

1. **Galpinsia Hartwegi** (Benth) Britt. (HARTWEG'S PRIMROSE). Low and branched from the base, with whitish pubescence; leaves from linear to lanceolate, nearly entire; flowers 3-4 cm. broad; the petals rhombic-obovate; capsule cylindrical; the seeds minutely tuberculate.

5. **MERIOLEX** (PRIMROSE)

Perennial from a persistent woody base, moderately branched, the leaves narrow and sharply dentate, the flowers regular and axillary, the disk-like stigma 4-toothed and the capsule sessile, 4-angled.

1. **Meriolix serrulata** (Nutt.) Walp. (TOOTHED-LEAVED PRIMROSE). Erect, 2-3 dm. high, slightly pubescent; leaves linear-oblong; profusely yellow-flowered, the petals crenulate. Frequent on sandy and stony ridges.

6. **CHYLISMA** (PRIMROSE)

Mostly small erect annuals, leafy at base and scapose (sometimes branched) stemmed; flowers small, with obovate petals and cylindrical capsules borne on slender pedicels.

1. **Chylisma scapoidea** (Nutt.) Small (SCAPOSE PRIMROSE). Nearly glabrous, from 1-3 dm. high, stem and branches slender; leaves ovate-oblong, somewhat pinnatifid; capsules 10-25 mm. long, obtuse at apex, acute at base. On steep banks, R. R. grades, etc.

7. **ANOGR**A (EVENING PRIMROSE)

Annual or perennial branched, canescent herbs, with white and often shreddy bark, white flowers, elongated calyx-tube, long capsule and numerous ovules in 1 row.

1. **Anogra coronopifolia** (T. and G.) Britt. (CUT-LEAVED EVENING PRIMROSE). A low branched perennial with deeply pinnatifid leaves, white flowers, petals broadly obovate and oblong capsule constricted at top; seeds tuberculate. Sandy plains.

2. **Anogra pallida** (Lindl.) Britt. (WHITE-STEMMED EVENING PRIMROSE). Perennial; the stems more or less branched, glabrous or nearly so, becoming white and glistening with shreddy bark; 3-7 dm. high, leaves linear, entire or remotely denticulate; flowers axillary; the corolla white, turning pink, about 4 cm. broad; capsule linear curved.

8. **PACHYLOPHUS** (PRIMROSE)

Stemless perennials with rosulate entire or pinnatifid leaves, basal flowers and capsules; the seeds smooth, a deep furrow along the raphe.

1. **Pachylophus caespitosus** (Nutt.) Raimann (TUFTED PRIMROSE). Leaves oval to lanceolate, deeply sinuate-dentate, tapering into slender petioles, usually densely pubescent, forming with the few large flowers a compact tuft on the crown; calyx pubescent, its tube 6-10 cm. long, with dilated mouth; corolla white, changing to rose, 7-9 cm. broad; capsule strictly basal and sessile, tuberculate. Stony mountain sides.

2. **Pachylophus montanus** (Nutt.) Aven Nelson (DESERT PRIMROSE). Smaller, the leaves only 3-5 cm. long, nearly entire, rather thick, sparingly pubescent on the faces, white-hirsute on the margins and midrib; calyx-tube about as long as the leaves, pubescent; the lobes pinkish, nearly glabrous; corolla 4-5 cm. broad, the petals broadly obcordate, changing to pink; capsule small and scarcely tubercled.

9. **LAVAUXIA** (PRIMROSE)

Quite similar to *Pachylophus*; flowers white or yellow; the capsule acutely angled or winged.

1. **Lavauxia brachycarpa** (Gray) Britt. (GAUDY PRIMROSE). Whitish, with a soft pubescence; leaves thick from entire to pinnatifid, narrowly ovate to lanceolate, petioled; flowers yellow, large, 6-8 cm. broad; capsule oblong, corky, wrinkled on the faces.

2. **Lavauxia triloba** (Nutt.) Spach. Nearly smooth, almost stemless, with leaves and flowers clustered; leaves 1-2 dm. long, long-petioled, oblanceolate, pinnatifid or toothed; flowers white or rose-colored; calyx-tube slender, 5-8 cm. long; petals 15-25 mm. long; pod ovate, 15-25 mm. long, strongly winged and veiny. Plains.

10. GAURA (GAURA)

Herbs with narrow alternate nearly entire leaves, racemose flowers, narrow calyx-tube with 4-lobed limb and an indehiscent nut-like fruit.

1. *Gaura coccinea* Pursh (SCARLET GAURA). Several stemmed and more or less branched, whitish-pubescent or nearly glabrous; leaves linear-lanceolate; flowers red or scarlet; capsule 4-sided at summit.

XLV. UMBELLIFERÆ (CARROT FAMILY)

Herbs with alternate compound leaves having expanded sheathing petioles, small flowers in umbels, minute or obsolete calyx, 5 petals, 5 stamens, 2 styles, and an inferior 2-celled ovary which splits in fruit into 2 seed-like fruits, each of which has usually 5 longitudinal ribs and 1 or more longitudinal oil-tubes in the intervals between the ribs and also on the face or commissure of each. (See *Plant Relations*, p. 83, Fig. 77; also *Plant Structures*, p. 267, Fig. 253.)

* Flowers yellow; fruit flattened laterally.

1. *Musineon*. Acaulescent; leaves pinnately decomposed; oil-tubes 3 in the intervals.

2. *Harbouria*. Stems erect, few-leaved; leaves ternately decomposed; oil-tubes solitary in the intervals.

3. *Zizia*. Stems erect, branching; leaves simple or of 3 large leaflets; oil-tubes solitary in the intervals.

** Flowers white; fruit long, linear, nearly terete, oil-tubes wanting.

4. *Washingtonia*. Slender plants, 4-7 dm. high, with ternately compound leaves.

*** Flowers white; fruit short, oblong or oval, flattened dorsally oil-tubes present.

5. *Phellopterus*. Stemless, the crowded umbel at the base of the rosette of much longer leaves; oil-tubes 1-3 in the intervals.

6. *Lomatium*. Nearly stemless, leaves basal; umbel on a long (1-3 dm.) naked peduncle; oil-tubes solitary in the intervals.

7. *Heracleum*. Large coarse perennial 1-2 m. high, with large ternate leaves; oil-tubes solitary in the intervals.

1. MUSINEON (MUSINEON)

Perennials with thick, usually fleshy, elongated roots, the very short stems simple or dichotomous; leaves about twice pinnate; the segments small, oblong or linear; the ribs on the carpel similar and filiform.

1. *Musineon divaricatum* (Pursh) C. & R. (Leafy Musineon). Decumbent-spreading, glabrous; leaves bi-pinnatifid with winged rachis; peduncles 6-12 cm. long, rarely surpassing the leaves; fruit smooth. Sandy plains.

2. **Musineon Hookeri** (T. & G.) Nutt. (HOOKER'S MUSINEON). Resembling the preceding; stems minutely scabrous or pubescent, the rachis of the leaves scarcely winged; fruit minutely scabrous. Naked slopes and ridges.

3. **Musineon tenuifolium** Nutt. (SCAPOSE MUSINEON). Tufted; the numerous tri-pinnatifid glabrous leaves crowded at the base; the segments linear; peduncles slender, much surpassing the leaves; fruit nearly glabrous. Stony slopes and ridges.

2. HARBOURIA (HARBOURIA)

Root-leaves several, tufted; stem-leaves 1-3, all ternately decomposed with linear segments; peduncles long, singly or more usually 2 from the uppermost leaf; ribs of the carpels obtuse and prominent, corky-thickened.

1. **Harbouria trachypleura** (Gray) C. & R. (HARBOUR'S PARSNIP). From 3-5 dm. high; umbels crowded, 15-25 rayed; the rays 12-25 mm. long; carpel nearly round in cross-section, about 4 mm. long.

3. ZIZIA

Smooth herbs 3-7 dm. high, with ternately divided leaves (or the basal ones simple), broad-toothed leaflets, yellow flowers, and ovate to oblong smooth fruit with slender ribs.

1. **Zizia cordata** (L.) Koch. (HEART-LEAVED MEADOW PARSNIP). Basal leaves cordate or rounder, crenately toothed, rarely lobed; stem-leaves 3- or 5-divided, with leaflets ovate to lanceolate, serrate; fruit ovate. Open ground, wet valleys.

4. WASHINGTONIA (SWEET CICELY)

Glabrous or hairy herbs 3-8 dm. high, from thick aromatic roots, with ternately compound leaves, ovate leaflets, white flowers, and linear very bristly fruit with prominent tail-like prolongation at base.

1. **Washingtonia obtusa** C. & R. (ROCKY MOUNTAIN SWEET CICELY). Slender and nearly glabrous; leaflets ovate to lanceolate, sharply toothed; umbel with widely divaricate rays; peduncles only 2-4, longer than the obtuse, only slightly pubescent or hispid fruit. Moist rich woods.

5. PHELLOPTERUS

Stemless or short-stemmed from thick roots with pale bipinnate leaves and umbels with scarious involucre and involuclers, fruit oblong to orbicular.

1. **Phellopterus montanus** Nutt. (MOUNTAIN PHELLOPTERUS). Stemless and nearly smooth, the flowers and fruit closely appressed to the ground among the bases of the leaves; carpels large, with 3-5 broad membranous wings. Early spring, on the plains.

6. LOMATIUM

Short-stemmed or stemless; leaves ternate or pinnate; fruit much flattened dorsally; only the lateral ribs winged.

1. **Lomatium orientale** C. & R. (MOUNTAIN PARSLEY). Softly pubescent on the peduncles; rays of umbel unequal, 1-3 cm. long; involucre wanting, involuclers of lanceolate, scarious-margined bracts; fruit orbicular, glabrous. Moist mountain slopes.

7. **HERACLEUM** (PARSNIP)

Thick-stemmed, with huge ternate leaves on petioles with greatly dilated base, large umbels with conspicuous white flowers and strongly flattened carpels.

1. **Heracleum lanatum** Michx. (COW-PARSNIP). Pubescent or woolly above; leaflets round-cordate, cut-toothed, 10-25 cm. broad; fruit oval, pubescent; the lateral ribs of carpels winged.

XLVI. **CORNACEÆ** (DOGWOOD FAMILY)

Usually shrubs with opposite (rarely alternate) simple leaves, 4 petals, 4 stamens, a single style, and an inferior 2-celled ovary becoming a 1- or 2-seeded fleshy stone-fruit.

1. **CORNUS** (CORNEL. DOGWOOD)

Herbs and shrubs with entire leaves, small flowers in open clusters or close heads, minutely 4-toothed calyx, and oblong spreading petals.

* Flowers greenish, in a close cluster surrounded by a large and showy 4-leaved corolla-like white or pinkish involucre.

1. **Cornus Canadensis** L. (DWARF CORNEL. BUNCH-BERRY). Stems low and simple, 1-2 dm. high, from a slender creeping rootstock; lower leaves scale-like, the upper crowded into an apparent whorl of 6 or 4, ovate and pointed; leaves of the involucre ovate; fruit globular, bright red. Damp cold woods.

* Flowers white, in flat open clusters, with no involucre.

2. **Cornus stolonifera** Michx. (RED-OSIER DOGWOOD). Shrubs forming clumps, 1-2 m. high, branches (especially the osier-like young ones) bright red-purple, smooth; leaves opposite, ovate, rounded at base, short-pointed, minutely hairy on both sides, whitish beneath; flowers in small loose clusters; fruit white or lead-color. Wet places.

XLVII. **PYROLACEÆ** (PYROLA FAMILY)

Herbs with evergreen foliage, corolla of separate petals, 10 stamens, anthers opening by pores at base, depressed globose 5-lobed pods, and otherwise as in *Ericaceæ*.

1. **Chimaphila**. Stems leafy, flowers in a terminal flat-topped cluster; style very short.

2. **Pyrola**. Leaves all basal; flowers in a raceme; style long.

1. **CHIMAPHILA** (PIPSISSEWA)

Low plants with long running underground shoots, evergreen thick and shining leaves, fragrant flowers in a terminal cluster, and orbicular widely spreading petals.

1. **Chimaphila umbellata**. Leafy, 1-2 dm. high; leaves wedge-lanceolate, sharply serrate, not spotted; flowers flesh color. Dry woods.

2. **PYROLA** (WINTERGREEN)

Low and smooth, with a cluster of rounded evergreen basal leaves, a simple raceme of nodding flowers on an upright stem, and concave more or less converging petals.

* Style straight ; flowers secund.

1. ***Pyrola secunda*** L. (ONE-SIDED WINTERGREEN). Leaves several, near the base of a short stem arising from a branched base, thin, ovate, crenate, 2-4 cm. long ; scape about 1 dm. long, bearing a 1-sided spike-like raceme of drooping, greenish-white flowers. Moist woods.

* * Style and stamens declined ; flowers simply racemose.

2. ***Pyrola chlorantha*** Sw. (GREEN-FLOWERED WINTERGREEN). Scape 1-2 dm. high ; leaves leathery, oval to orbicular, entire or nearly so ; flowers 3-10 ; the calyx-lobes very short and obtuse, appressed to the greenish-white corolla ; anther cells with beaked tips. Sub-alpine woods.

3. ***Pyrola uliginosa*** Torr. (BOG WINTERGREEN). Scape 2-4 dm. high ; leaves large, thick, dark, oval to orbicular, obscurely crenate ; flowers 8-15, with ovate-lanceolate calyx-lobes about one-third as long as the rose-colored or purple petals ; anther cells beaked. Mountain bogs.

XLVIII. **ERICACEÆ** (HEATH FAMILY)

Shrubs or small trees with regular sympetalous 4-5-parted flowers, as many or twice as many stamens (10 in ours), anthers opening by terminal holes, solitary styles, and a superior ovary becoming a berry-like fruit (in ours), with 5-10 seed-like nutlets. (See *Plant Relations*, p. 200, Fig. 167 ; also *Plant Structures*, p. 269, Fig. 254 ; p. 270, Fig. 255 ; p. 271, Fig. 256.)

1. **ARCTOSTAPHYLOS** (BEARBERRY)

Shrubs with alternate leaves, nearly white flowers in terminal clusters, urn-shaped corolla with a short revolute 5-toothed border, included stamens, and a berry-like fruit.

1. ***Arctostaphylos Uva-ursi*** (L.) Spreng (KINNI-KI-NIC). Trailing ; leaves thick and evergreen, obovate or spatulate, entire, smooth ; fruit red. Bare ground and rocks.

XLIX. **VACCINIACEÆ** (WHORTLEBERRY FAMILY)

Like *Ericaceæ*, but ovary inferior and forming an edible berry or berry-like fruit.

1. **VACCINIUM** (BLUEBERRY)

Shrubs with simple leaves, solitary or clustered white or reddish flowers, corolla with 5-cleft revolute border, 10 stamens with anthers prolonged upward into a tube, and a 5-celled edible berry with many seeds.

1. **Vaccinium caespitosum** Michx. (DWARF BLUEBERRY). Usually in dense patches in moist woods. Stems dwarf, bushy-branched, 1-2 dm. high, branchlets terete; leaves from oblong-cuneate to obovate, minutely serrate, green, smooth and reticulate veined; flowers solitary in the axils; berry blue, glaucous, about 6 mm. in diameter. Berry delicious.

2. **Vaccinium erythrococcum** Rydb. (RED BLUEBERRY). In dense patches often of large extent. Freely branched from near the base, about 2 dm. high; the branches crowded, erect, slender, green, angled, sparsely leafy; leaves small, from ovate to narrowly oblong, 5-10 mm. long, glabrous and veiny; flowers small, sub-globose, pinkish-white, nearly sessile; berries finally dark red. In the mountains.

L. PRIMULACEÆ (PRIMROSE FAMILY)

Herbs with simple leaves, regular sympetalous flowers, 5 stamens opposite the corolla-lobes, a single style, a 1-celled ovary with ovules on a free central axis, and fruit a pod.

* Scapose; leaves clustered at the base; flowers in umbels.

1. **Primula**. Corolla-tube longer than the calyx; style slender.

2. **Androsace**. Corolla-tube shorter than the calyx; style short.

3. **Dodecatheon**. Petals reflexed; stamens monadelphous, forming a slender projecting cone.

** Stems leafy; flowers axillary.

4. **Steironema**. Tall and leafy; flowers large; corolla rotate.

5. **Glaux**. Small, with fleshy leaves; corolla wanting.

1. PRIMULA (PRIMROSE)

Herbs with flowers in an umbel, a 5-toothed calyx, a funnel-form or salver-form corolla with 5 included stamens inserted opposite its lobes.

1. **Primula Americana** Rydb. (AMERICAN PRIMROSE). Scape 1-3 dm. high, mealy when young; leaves more or less mealy, from oblong to spatulate, with short, winged petioles; bracts of the umbel linear-lanceolate, nearly equaling the pedicels of the flowers but much shorter than the pedicels in fruit; corolla lilac, its tube scarcely longer than the calyx, lobes obcordate. Wet meadows.

2. **Primula Parryi** Gray (ILL-SMELLING PRIMROSE). Scapes stout, 2-5 dm. high; leaves large, succulent, spatulate to oblanceolate, 1-3 dm. long; flowers large and showy, 5-12, with glandular calyx, and rose-colored corolla with yellow eye. Frequent on the margins of sub-alpine streams.

2. ANDROSACE

Small annuals or perennials with involucrate umbels of small white 5-merous flowers, salver-form corolla and turbinate or globose capsules.

1. **Androsace diffusa** Small (SPREADING ANDROSACE). Annual, pubescent; leaves rosulate, oblanceolate to spatulate, serrate or toothed, sessile or with short, winged petioles; scapes spreading, 3-8 cm. high; the pedicels of the umbel very unequal; calyx turbinate-campanulate, with triangular teeth equaling or surpassing the white or pink corolla. Open woods and in cañons.

2. **Androsace septentrionalis** L. (NORTHERN ANDROSACE). Leaves in a close rosette, oblanceolate, with a few teeth near the apex; scapes several, slender; the pedicels sub-equal, short at first but in fruit spreading, 5-10 cm. long and nearly as long as the scape; the white petals surpassing the green teeth of the calyx. Woods; in the mountains.

3. **Androsace capillaris** Greene (HAIR-STEMMED ANDROSACE). Perennial 6-12 cm. high; scapes numerous from the rosette of dentate, ovate-lanceolate leaves, filiform; flowers minute, numerous, on capillary pedicels. Boggy margins of streams.

3. DODECATHEON (AMERICAN COWSLIP. SHOOTING-STAR)

Smooth herbs with fibrous roots, a basal cluster of oblong or spatulate leaves, a single naked stem bearing an umbel of showy flowers nodding on slender stalks, deeply 5-cleft calyx with reflexed divisions, corolla with very short tube and long and narrow reflexed divisions, and anthers approximate in a slender cone.

1. **Dodecatheon pauciflorum** (Durand) Greene (BOG SHOOTING-STAR). Glabrous, leaves sub-erect; segments of corolla lilac-purple, the short everted tube yellow, a scalloped ring of purple between the base of the segments and the stamen tube; anthers yellow; capsule terete, opening by 5 short teeth. Wet alkaline meadows and swamps.

4. STEIRONEMA (LOOSESTRIFE)

Glabrous perennials with opposite leaves (apparently whorled on the branches) and large yellow flowers with 5 fertile and 5 sterile stamens.

1. **Steironema ciliatum** (L.) Raf. (FRINGED LOOSESTRIFE). Leaves ovate-lanceolate, with short, ciliate petioles; flowers nodding on long slender peduncles; tube of corolla very short, the segments erose and usually cuspidate.

5. GLAUX

Perennial from rhizomes; with low, simple or branched stems, small, succulent leaves, axillary pink or white flowers (without corolla), 5 stamens alternate with the calyx-lobes and a glandular ovary.

1. **Glaux maritima** L. (GLAUX. SALTWORT). From 5-10 cm. high, leaves sessile, oblong or narrow; flowers nearly sessile in the axils, 3-4 mm. broad; the calyx-lobes oval.

LI. GENTIANACEÆ (GENTIAN FAMILY)

Glabrous herbs with bitter juice, opposite simple leaves, regular flowers convolute in the bud, stamens as many as the lobes of the corolla, 1-celled ovary with 2 parietal placentæ and many-seeded capsule.

1. **Gentiana**. Low herbs, with funnel-form or campanulate corollas without nectariferous pits or glands.

2. **Frasera**. Stout and tall, with rotate corolla bearing a pair of approximate fringing glands at the base of the lobes.

1. GENTIANA (GENTIAN)

Herbs with nearly sessile leaves, tubular 4-5-cleft calyx, 4-5-lobed showy corolla and sessile or short-styled stigma cleft into 2 lamellæ.

* Corolla without teeth or folds in the sinuses, the lobes fringed.

1. *Gentiana elegans* Aven Nelson (ADORNED GENTIAN). Annual; stems 1 or more, 1.5-3 dm. high, simple, terminated by a single large peduncled flower; leaves 3-6 pair, obovate to spatulate; calyx-lobes nearly equal, as long as the tube; corolla deep blue with lighter streaks downward, 4-5 cm. long, its lobes toothed at the summit, fringed on the sides.

** Corolla with teeth or folds in the sinuses, the lobes not fringed.

2. *Gentiana Parryi* Engelm. (PARRY'S GENTIAN). Stems several; leaves ovate to oblong, thick, sessile, 8-12 pairs, the uppermost 2 or 3 pairs somewhat enlarged and subtending the 1-5 large bell-shaped dark-blue corollas like an involucre; lobes of the calyx short-linear; the appendages in the sinuses deeply 2-cleft. Frequent in sub-alpine parks.

3. *Gentiana affinis* Griseb. (OBLONG-LEAVED GENTIAN). The several or numerous stems clustered, ascending, 2-4 dm. long; leaves mostly oblong, 7-14 pairs; flowers many (and thyrsoid-racemose) to few, 2-3 cm. long; calyx-lobes linear, very unequal; corolla dark blue, with acute lobes, narrowly funnel-form. Frequent in meadows and valleys at middle elevations.

2. FRASERA (COLUMBO)

Biennials from large woody roots, with stout, tall, column-like very leafy stems, rotate 4-parted corolla having conspicuous fringed glands on the base of each lobe, and a coriaceous flattened capsule.

1. *Frasera speciosa* Dougl. (CONSPICUOUS COLUMBO). Leaves in first year plants rosulate on the crown; the second year in whorls of 4-6 on the 7-15 dm. high, simple stems, spatulate or oblong 2-3 dm. long, passing into the lanceolate foliar bracts of the crowded spicate thyrsus; flowers greenish-white with dark dots. Widely distributed on open hills and in open woods in the mountains.

LII. APOCYNACEÆ (DOGBANE FAMILY)

Herbs or woody plants with opposite entire leaves, regular sympetalous flowers with parts in 5's, 2 distinct ovaries or a 2-celled ovary, and fruit a pod.

1. APOCYNUM (DOGBANE)

Herbs with upright branching stems, small and pale flowers in flattish clusters, bell-shaped 5-cleft corolla, stamens on base of corolla and with anthers converging about the stigma, and 2 distinct ovaries united at tip by the stigma and becoming 2 long slender pods containing seeds, with a tuft of long silky hairs at the apex. (See *Plant Structures*, p. 272, Fig. 257.)

1. *Apocynum androsaemifolium* L. (SPREADING DOGBANE). Branches forking and spreading; leaves ovate, distinctly petioled; flower-clusters loose and spreading; corolla pale rose-color, open bell-shaped, with revolute lobes, the tube much longer than the divisions of the calyx. Borders of thickets.

2. **Apocynum cannabinum** L. (INDIAN HEMP). Stem and branches upright or ascending; leaves oval to oblong, sessile or short-petioled; flower-clusters erect and closely many-flowered; corolla greenish-white, with nearly erect lobes, and tube not longer than the divisions of the calyx. Moist ground.

LIII. ASCLEPIADACEÆ (MILKWEED FAMILY)

Perennial herbs with milky juice; opposite leaves, perfect regular umbellate flowers with 5 sepals, petals and stamens and 2 ovaries connected by the united styles and common stigma. Calyx and corolla reflexed, the lobes valvate in bud; a crown of 5 hooded lobes between the petals and the tube of united filaments which surrounds the pistil, each hood with an incurved horn; anthers adherent to the stigma, each containing a pair of pollinia; ovaries becoming a pair of large follicles containing compressed seeds bearing a tuft of long silky hair. (For further details see any of the standard Manuals, *Coulter*, *Gray*, *Britton*, etc.)

1. ASCLEPIAS (MILKWEED)

Characters as given for the family.

1. **Asclepias speciosa** Torr. (SHOWY MILKWEED). Pale, with tomentose pubescence; stem simple, stout, 4-8 dm. high; leaves opposite, large and thick, broadly oval to ovate, 6-14 cm. long, on short petioles; umbels 1 or more, many-flowered; corolla purple or tinged with green, its lobes oblong; hoods lanceolate, with short inflexed horn; follicles erect on deflexed pedicels, densely tomentose and marked with soft spine-like processes. Frequent on moist banks.

LIV. CONVULVACEÆ (MORNING-GLORY FAMILY)

Herbs often twining or trailing, with alternate leaves, 5 separate sepals, 5-lobed sympetalous corolla, 5 stamens, 1 or 2 styles, a superior 2- or 3-celled ovary becoming a globular few-seeded pod. (See *Plant Structures*, p. 270; also p. 273, Fig. 258.)

1. **Ipomœa**. Style undivided and with a knob-like stigma.

2. **Convolvulus**. Style undivided, 2-cleft at apex.

3. **Evolvulus**. Styles 2, distinct or nearly so, each 2-cleft at apex.

1. IPOMŒA (MORNING-GLORY)

Ours a perennial herb from an enormous deep-set root, with numerous slender spreading branches (not twining), 5-12 dm. high, linear leaves and large showy funnel-form purplish or crimson corolla.

1. **Ipomœa leptophylla** Torr. (BUSH MORNING-GLORY). Glabrous, freely branched; leaves 4-7 cm. long; sepals ovate; corolla 5-8 cm. long; seeds pubescent. Banks of creeks and ravines in the plains and foothills.

2. CONVULVULUS (BINDWEED)

Trailing, twining, or erect herbs with funnel-form to bell-shaped corolla, and a single style with 2 slender or oval stigmas.

1. **Convolvulus sepium** (HEDGE BINDWEED). Smooth or somewhat hairy; stem twining or extensively trailing; leaves triangular-halberd-shaped or arrow-shaped, acute or pointed, the basal lobes obliquely truncate and often toothed or lobed; calyx inclosed in two broad leafy bracts; corolla white or tinged with rose; stigmas oval. Along streams. (See *Plant Structures*, p. 273, Fig. 258.)

2. **Convolvulus arvensis** (BINDWEED). Stems low, prostrate, or twining; leaves ovate-oblong, arrow-shaped, with acute basal lobes; calyx without inclosing bracts; corolla white or tinged with red; stigmas very slender. Fields; from Europe.

3. EVOLVULUS (EVLVULUS)

Mostly silky-pilose perennial herbs, with small leaves and small axillary flowers, filiform filaments and a 2-celled ovary.

1. **Evolvulus pilosus** Nutt. Branched from a woody base, 6-15 cm. high, the branches slender and leafy; flowers solitary in the axils; the corollas blue or purplish, short-funnel-form or nearly rotate.

LV. POLEMONIACEÆ (POLEMONIUM FAMILY)

Herbs with alternate or opposite leaves, regular 5-parted sympetalous flowers, 5 stamens on the corolla-tube, a 3-lobed style, and a superior 3-celled ovary becoming a pod.

1. **Phlox**. Corolla salver-form; leaves opposite, entire.

2. **Gilia**. Corolla funnel-form or tubular; leaves opposite or alternate.

3. **Collomia**. Corolla tubular; leaves alternate, entire.

4. **Polemonium**. Corolla funnel-form; leaves alternate, pinnately compound.

1. PHLOX (PHLOX)

Perennial herbs, ours mostly low, with somewhat woody caudex, opposite sessile entire leaves, terminal clusters of flowers, narrow tubular calyx, corolla with long tube and 5 flaring lobes and stamens very unequally inserted and included in the tube. (See *Plant Relations*, p. 80, Fig. 74b; also *Plant Structures*, p. 228, Fig. 210b.)

* Cespitose, the mats low and broad.

1. **Phlox bryoides** Nutt. (MOSS PHLOX). Mats depressed, very dense; leaves imbricated, 4-ranked, minute, from ovate to lanceolate, copiously ciliate with woolly hairs; tube of the white corolla longer than the calyx. Denuded stony slopes and hilltops.

2. **Phlox Hoodii glabrata** Elias Nelson (LARAMIE PHLOX). Mats closely appressed to the ground, profusely slender branched, glabrous except for a few woolly hairs on the calyx and at the base of the subulate, 4-10 mm. long leaves; corolla white, rarely pink. 7-10 mm. broad, its tube longer than the calyx. One of the earliest flowers on the plains and in the foothills. So closely appressed to

the ground that the small white flowers suggest drops of milk spattered on the ground.

3. **Phlox multiflora** Aven Nelson (SHOWY PHLOX). Base woody and freely branched, with numerous short, nearly erect, herbaceous, 1-flowered branchlets; leaves broadly linear, glabrous, 1-2 cm. long; calyx angled by the prominent midrib of its lobes, which are as long as the tube; corolla white or pink, about 2 cm. broad, its tube exceeding the calyx. Very showy; moist cañons and slopes.

* * Plants single, or loosely tufted, with woody base and distant leaves.

4. **Phlox longifolia** Nutt. (LONG-LEAVED PHLOX). Slender and mostly erect, 10-25 cm. high, the lower part of the stem woody and perennial; leaves linear, with prominent midrib and thickened margins, 3-6 cm. long; flowers in small corymbose cymes, white, about 2 cm. broad. Hillsides and mountain slopes.

2. GILIA (GILIA)

Annual, biennial or perennial herbs, or sometimes shrubby; calyx 5-toothed or cleft, scarious in the sinuses; corolla various in shape; capsule 3-celled.

* Leaves alternate, entire or nearly so; flowers spicate.

1. **Gilia spicata** Nutt. (SPICATE GILIA). Glabrate, the stems simple, 1.5-3 dm. high; leaves thickish, linear and entire, or sometimes 3-cleft; flowers in a dense thyrsoid spike; flowers bracteate, the bracts and calyx-lobes pungent; corolla-lobes shorter than the tube. Sandy draws and slopes.

* * Leaves fascicled, palmately parted, rigid and pungent; flowers solitary or few in a cluster at the summit of the branchlets.

2. **Gilia pungens** Benth. (PRICKLY GILIA). Shrubby and rigidly branched, 1-2 dm. high; somewhat viscid-puberulent; leaves 3-5-parted into linear, rigid, pungent lobes, densely fascicled in the axils; flowers funnel-form, the limb 12-18 mm. broad, white or pinkish. Ravines and cañons.

* * * Leaves pinnately parted into linear segments; flowers thyrsoid-paniculate; corolla salver-form or funnel-form with long slender tube.

3. **Gilia aggregata** Spreng. (SCARLET GILIA). Somewhat pubescent, loosely branched 4-8 dm. high; leaves with thickish, linear, sharp-pointed lobes; flowers in small nearly sessile clusters; corolla scarlet or pink-red, with slender tube 3-4 cm. long, and short lanceolate soon recurved lobes.

4. **Gilia laxiflora** (Coulter) G. E. O. (COLORADO GILIA). Annual branched, glabrous below, minutely glandular upward, 2-3 dm. high; leaves with filiform mucronate segments; inflorescence open; corolla white, slender-tubular with acuminate lobes, 2-3 cm. long and 2 or 3 times as long as the calyx.

5. **Gilia longiflora** (Torr.) Don. (WHITE-FLOWERED GILIA). Resembling the preceding, but larger, freely branched from the base; corolla white, salver-form, the limb about 2 cm. broad, the tube slender, 3-4 cm. long and 6 or 7 times as long as the narrowly campanulate calyx.

* * * * Leaves pinnately lobed; flowers paniculate; corolla salver-form, small, only 6-10 mm. long.

6. **Gilia pinnatifida** Nutt. (SMALL-FLOWERED GILIA). Biennial or perennial, viscid-glandular, especially above; leaves crowded on the crown, becoming small and distant above, linear-oblancoate in outline, deeply pinnatifid, the small lobes linear-oblong; flowers numerous; corolla violet or blue, its tube barely exceeding the calyx. Dry sandy soil.

3. **COLLOMIA**

Small annuals with entire narrow alternate leaves, tubular corolla, straight stamens, and ovules solitary in each cell.

1. **Collomia linearis** Nutt. (NARROW-LEAVED COLLOMIA). Somewhat viscid-pubescent, stems either slender simple and erect or at length much branched, 5-20 cm. or more high; leaves linear-oblong or lanceolate; corolla white or purplish, the slender tube exceeding the calyx.

4. **POLEMONIUM**

Herbs with alternate pinnately compound leaves, spicate or cymose-paniculate flowers, cylindraceous or campanulate calyx, funnel-form or campanulate corolla and stamens inserted on the corolla-tube.

1. **Polemonium mellitum** (Gray) Aven Nelson (HONEY-SCENTED POLEMONIUM). Clammy and viscid-pubescent, the herbage rank musk-scented, tufted, 1-2 dm. high; leaflets numerous, small, crowded (as if verticillate); inflorescence short-spicate; corolla 2-3 cm. long, white, tubular funnel-form, its tube much longer than the calyx and the corolla-limb, honey-scented. Sides of rocky cliffs; middle elevations.

2. **Polemonium pulchellum** Bunge (PRETTY POLEMONIUM). Finely pubescent, especially above, 1-2 dm. high; leaflets 15-21, oblong; inflorescence cymose-paniculate; calyx cleft below the middle; corolla campanulate-funnel-form, its tube shorter than the calyx and the violet or bluish corolla-limb. Frequent in the Colorado Mountains.

LVI. **HYDROPHYLLACEÆ** (WATERLEAF FAMILY)

Mostly hairy herbs with alternate leaves, 5-parted calyx, bell-shaped sympetalous 5-lobed corolla, 5 stamens on the corolla-tube, a 2-cleft style, and a superior 1-celled ovary becoming a many-seeded pod.

1. **Hydrophyllum**. Stamens and style conspicuously exserted; corolla convolute in bud; ovary bristly hairy; leaves large, green, and hirsute.

2. **Macrocalyx**. Stamens shorter than the corolla; calyx enlarging in fruit.

3. **Phacelia**. Stamens exserted; corolla imbricated in bud; leaves entire or pinnatifid, whitish or silvery pubescent (in the species here given).

1. **HYDROPHYLLUM** (WATERLEAF)

Herbs with large petioled leaves, flattish clusters of white or pale-blue flowers, mostly protruding stamens, and a 1-celled bristly-hairy ovary.

1. **Hydrophyllum occidentale** Gray (WESTERN WATERLEAF). Hirsute-pubescent, 2-5 dm. high; leaves oblong-lanceolate in outline, pinnately parted into 7-15 divisions, the divisions toothed or incised; cymes dense, capitate, on elongated peduncles; corolla campanulate, violet purple, varying to white.

2. MACROCALYX

Low spreading annuals with tender, somewhat hirsute herbage; alternate pinnately parted leaves, and a small white corolla in a star-shaped gradually enlarging calyx.

1. **Macrocalyx Nyctelea** (L.) Kuntze (NYCTELEA). Peduncles 1-flowered, opposite the leaves; calyx-lobes lanceolate, about equaling the corolla, in fruit 10-12 mm. long; capsule globose, pendulous.

3. PHACELIA (PHACELIA)

Biennials or perennials, with hirsute, hispid or glandular pubescence, alternate leaves, flowers in dense, 1-sided, recurved or spicate cymes, and reticulate or pitted seed-coat.

1. **Phacelia leucophylla** Torr. (SILKY PHACELIA). Perennial, more or less tufted, densely silky-pubescent, the several or numerous stems ascending; leaves oblong or lanceolate, mostly entire, the lower long-petioled; flowers sessile, in dense scorpioid cymes; calyx-lobes hispid, shorter than the 5-lobed bluish corolla; corolla-tube with 10 vertical lamina or folds (in pairs) between the filaments. Frequent on shale slopes and in the mountains.

2. **Phacelia sericea** (Graham) Gray (WYOMING PHACELIA). Perennial, sericeously-silky, with a close pubescence; stems usually several, 2-3 dm. high; leaves pinnately parted into narrow oblong divisions; inflorescence of several short spikes in a close terminal naked thyrsus; corolla violet-blue or whitish; stamens long-exserted; style 2-cleft at apex. Stony ravines.

LVII. BORAGINACEÆ (BORAGE FAMILY)

Mostly rough hairy herbs with alternate entire leaves, 5-parted calyx, regular 5-lobed sympetalous corolla, 5 stamens on the corolla-tube, a deeply 4-lobed superior ovary, becoming 4 seed-like nutlets with the style arising from the center.

* Nutlets attached to the style by more or less of their ventral face or angle; throat of corolla-tube with 5 crests or folds.

1. **Lappula**. Pubescent; flowers blue or white, with short tube; nutlets armed with barbed prickles.

2. **Oreocarya**. Rough hirsute or hispid; flowers white (in the species given) with short tube; nutlets unarmed.

3. **Mertensia**. Smooth or nearly so; flowers blue; corolla tubular-funnel-form or trumpet-shaped; mature nutlets wrinkled.

** Nutlets attached by their base, smooth and bony when mature; throat crested.

4. **Lithospermum**. Strigose pubescent; flowers yellow, corolla salver-form or trumpet-shaped.

1. LAPPULA (STICKSEED. BEGGAR-LICE)

Pubescent or hispid-canescant annuals or perennials with narrow alternate leaves, deeply 5-cleft calyx, salver-form corolla with 5-spreading lobes and its throat closed by the 5 crests, the margins or backs of the nutlets armed with barbed prickles and the sides often papillose.

1. *Lappula occidentalis* (Wats.) Greene (WESTERN STICKSEED). Annuals, from 1-3 dm. high, more or less branched from the base upward, the branches slender, bracteate-floriferous; leaves linear, mostly obtuse; flowers small; nutlets with 7-11 stoutish marginal prickles (not at all or scarcely connected at base) and numerous small, low, whitish tubercles on the back and sides. Frequent on the plains.

2. *Lappula erecta* Aven Nelson (UPRIGHT STICKSEED). Annual, canescently-pubescent, stoutish, erect, 2-3 dm. high; stems singly or 2 or more from the crown; leaves linear-oblancoelate, rosulate on the crown, with numerous stem-leaves passing into the foliar bracts of the branched summit; nutlets with about 10 marginal prickles (connected at the base by an obscure marginal ridge) and minutely and densely muricate on all sides, the murications on the dorsal ridge more prominent. Sandy cañons and slopes.

3. *Lappula floribunda* (Lehm.) Greene (LARGE-FLOWERED STICKSEED). Perennial, rough-pubescent, stout, 5-12 dm. high; stems erect, mostly simple; leaves oblong to linear-lanceolate, 5-10 cm. long, the basal with margined petioles; flowers blue, often 8-10 mm. broad; nutlets with flat marginal prickles somewhat confluent, the back elongated-triangular and merely scabrous. Common on moist rich banks.

2. OREOCARYA (OREOCARYA)

Rough-hispid biennials or perennials, with woody roots, white or yellow salverform flowers crested in the throat, 4 acute-margined nutlets attached laterally to a subulate prolongation of the receptacle.

1. *Oreocarya affinis* Greene (SMALL OREOCARYA). Biennial, 1-2 dm. high; stems singly or usually several from the crown (a stoutish, erect central or main stem with 2 or more smaller ones ascending from the base); leaves from obovate to lanceolate, canescent and bristly hirsute; flowers in short racemes forming a sub-cylindric spicate thyrus for two thirds the length of the stem; nutlets more or less tuberculate or ridged on the back. Frequent on naked hills and slopes.

2. *Oreocarya thysiflora* Greene (LARGE OREOCARYA). Very rough hispid, 2-4 dm. high, usually 2 or more equally stout ascending or erect stems from the large woody root; leaves mostly oblanceolate; the large paniculate thyrus with dense tawny hispid pubescence; corolla-tube shorter than the calyx-segments; nutlets small, acute-margined, somewhat rugose on the back. Sandy plains and foothills.

3. *Oreocarya virgata* (Porter) Greene (PORTER'S OREOCARYA). Bristly hispid, the hairs mostly from a white pustulate base; 2-6 dm. high; stem single, very stout and erect, or sometimes 2 or more from the base, and then smaller; leaves oblong-linear, acutish; inflorescence a long close spicate thyrus with leafy bracts much longer than the dense flower clusters; nutlets broadly ovate, somewhat papillose on the back. Open sandy slopes in the foothills and mountains.

3. MERTENSIA (MERTENSIA)

Perennials, smooth or minutely pubescent with alternate leaves, blue funnel-form or tubular showy flowers in racemose panicles or cymes, entire stigma, and 4 rugose (when mature) nutlets.

* Filaments inserted in the throat, enlarged and as broad or broader than the anther; style exserted.

1. *Mertensia ciliata* (Torr.) Don. (TALL MERTENSIA). Smooth and somewhat glaucous, the stems usually clustered, erect or spreading, 3-10 dm. high, very

leafy; leaves large and veiny, ovate-lanceolate; panicle crowded, the flowers slender-pedicel; calyx-lobes short-oblong, obtuse, ciliate; not more than one fourth as long as the corolla-tube. Moist places in the mountains.

2. *Mertensia lanceolata* (Pursh) DC. (LANCE-LEAVED MERTENSIA). Glabrous or nearly so; stems usually several, procumbent, becoming paniculately branched at summit, 1-3 dm. long; leaves lance-oblong to linear; calyx-lobes linear-oblong; corolla-tube longer than the calyx and longer than the limb, hairy at the base within. Common in the foothills.

* * Filaments inserted either on the margin of the throat or near the middle of the tube, narrower than the anther; style included.

3. *Mertensia alpina* Don. (ALPINE MERTENSIA). Glabrous and glaucous, tufted, 7-15 cm. high; root-leaves ovate to narrowly oblong, on slender petioles as long or longer than the blade, stem-leaves becoming sessile above; flowers in a close cluster; the calyx-lobes about as long as the corolla-tube. In early spring on stony slopes.

4. LITHOSPERMUM (PUCCOON)

Perennials with thick semi-woody roots, yielding a red stain, funnel-form or salver-form corolla, 5 included stamens, and 4 white polished nutlets.

1. *Lithospermum multiflorum* Torr. (MANY-FLOWERED PUCCOON). Strigose-hispid, 3-5 dm. high; stems several, simple, leafy; leaves linear-oblong; flowers crowded, short-pedicel; corolla 10-14 mm. long, tubular with narrow limb, its tube at least twice as long as the calyx, pubescent crests in the throat inconspicuous. In the mountains.

2. *Lithospermum linearifolium* Goldie (NARROW-LEAVED PUCCOON). Minutely strigose-pubescent; stems tufted; at first low simple and erect, becoming branched and spreading, 1-3 dm. high; leaves linear; flowers bright yellow; the earlier conspicuous, 15-18 mm. broad with slender tube about 2 cm. long, and large crests in the throat; the later ones small and pale, inconspicuous and probably cleistogamous. On the plains; common.

LVIII. VERBENACEÆ (VERVAIN FAMILY)

Herbs with opposite leaves, tubular 5-toothed calyx, tubular sympetalous corolla with flaring 5-cleft border, 4 included stamens, a slender style, and a superior ovary splitting into 4 seed-like nutlets in fruit.

1. VERBENA (VERVAIN)

Herbs with flowers in spikes or heads, and unequal (didynamous) stamens.

* Anthers not appendaged, flowers small, in dense spikes.

+ Bracts inconspicuous; flowers blue or purple.

1. *Verbena hastata* (BLUE VERVAIN). Tall, 10-15 dm. high; leaves lanceolate or oblong-lanceolate, taper-pointed, cut-serrate, petioled, the lower often lobed and sometimes halberd-shaped at base; spikes erect, with blue flowers. Waste ground and roadsides.

2. **Verbena stricta** Vent. (HOARY VERVAIN). Downy with soft white hairs, erect, simple or branched, 3-5 dm. high; leaves sessile, obovate or oblong, serrate; spikes thick, somewhat clustered, hairy, with rather large purple flowers. Barrens and cañons.

+ + Bracts large and leaf-like; flowers purplish.

3. **Verbena bracteosa** Michx. (PROSTRATE VERBENA). Widely spreading or prostrate, hairy; leaves wedge-lanceolate, cut-pinnatifid or 3-cleft, short-petioled; spikes single, remotely flowered with large often lobed bracts longer than the small bluish-purple flowers. Prairies and waste ground.

* * Anthers of longer stamens glandular-tipped; flowers showy, in heads becoming spicate.

4. **Verbena bipinnatifida** Nutt. (PRAIRIE VERBENA). Hirsute-pubescent, spreading by suckers; stems mostly erect, 15-25 cm. high; leaves ovate, bipinnatifid, the segments linear-oblong; flowers showy; the calyx hardly equaling the narrow bracts; corolla purple or lilac, its lobes obcordate; nutlets oblong, retrorsely scabrous on the grooved commissure. Plains and prairies; and one of the several parents of the cultivated Verbenas.

LIX. LABIATÆ (MINT FAMILY)

Herbs with square stems, opposite aromatic leaves, more or less 2-lipped corolla, 2 or 4 stamens, a single style, and a deeply 4-lobed ovary becoming 4 seed-like nutlets. (See *Plant Structures*, p. 272; also p. 274, Figs. 259 and 260.)

* Stamens 2.

1. **Monarda**. Calyx tubular; corolla strongly 2-lipped; large flowers in whorled heads.

2. **Hedeoma**. Flowers in small cymes in the axils of the leaves and bracts; calyx 13-nerved.

* * Stamens 4.

+ Corolla almost equally 4-lobed; stamens erect, distant.

3. **Mentha**. Flowers small, in axillary spikes or heads; aromatic fragrant herbs.

+ + Corolla 2-lipped, the upper lip concave or arched.

++ Inner pair of stamens longer than the outer.

4. **Dracocephalum**. Corolla small, included in the calyx.

++ ++ Outer pair of stamens longer than the inner.

= Calyx deeply 2-lipped, reticulate-veined (No. 5) or lips entire (No. 6).

5. **Prunella**. Cluster of sessile flowers forming a close spike or head.

6. **Scutellaria**. Calyx with a crest or hump-like ridge on the upper side.

= = Calyx almost equally 5-toothed obscurely nerved.

7. **Physostegia**. Flowers in a bracted spike, upper lip of corolla entire.

= = = Calyx 5-10-nerved, 5-toothed.

8. **Stachys**. Flowers in an interrupted spike; calyx 5-10-nerved.

1. **MONARDA** (HORSE MINT)

Odorous erect herbs with entire or toothed petioled leaves, rather large flowers in whorled heads closely surrounded by bracts, elongated tubular 5-toothed calyx, strongly 2-lipped elongated corolla, upper lip erect and entire or notched, lower lip 3-lobed at apex, and 2 elongated ascending stamens.

1. ***Monarda menthaefolia*** Graham (ROCKY MOUNTAIN HORSE MINT). Minutely appressed-pubescent, with a slightly glaucous hue; 3-7 dm. high, simple or somewhat branched above; leaves ovate-lanceolate, serrate; heads solitary, terminating the stem and branches (if any); calyx slightly hairy in the throat; corolla lilac, somewhat purplish-dotted; stamens protruded beyond the upper lip. Frequent in the valleys of the foothills.

2. ***Monarda Nuttallii*** Aven Nelson (NUTTALL'S MONARDA). Puberulent upwardly, somewhat whitened and the foliar bracts tinged with purple, 2-4 dm. high; leaves lanceolate or narrower; the bracts oblong, the mid-nerve prolonged into an aristate tip; heads in the axils of the uppermost pairs of leaves; calyx-teeth aristate and soon spreading, ciliate-bearded; corolla white or pinkish, not spotted but more or less punctate. Dry plains.

2. **HEDEOMA** (PENNYROYAL)

Cineros-puberulent perennials, aromatic, flowers in small axillary cymes, whitish or purplish corolla, perfect stamens only two, sterile ones (staminodia) minute, and nutlets smooth and ovoid.

1. ***Hedeoma Drummondii*** Benth. (DRUMMOND'S PENNYROYAL). Freely branched from a somewhat woody base, from 5-15 cm. high; leaves oblong to linear, obtuse; calyx hirsute, with subulate teeth, becoming closed in fruit; corolla purple. Dry cañons and slopes.

3. **MENTHA** (MINT)

Fragrant herbs with small purple or whitish flowers in close axillary clusters or spicate, bell-shaped or tubular 5-toothed calyx, corolla with short tube and a bell-shaped 4-cleft border (upper lobe largest, entire or 2-cleft), and 4 equal and distant stamens. (See *Plant Structures*, p. 229, Fig. 212.)

1. ***Mentha Canadensis*** L. (AMERICAN WILD MINT). Perennial by rhizomes, from nearly glabrous to distinctly hairy, 1-3 dm. high; stems simple or branched; leaves mostly ovate-lanceolate, serrate, petioled, the uppermost axils flowerless; calyx hairy, its teeth one fourth as long as the campanulate tube. General; wet banks, both plains and mountains.

4. **DRACOCEPHALUM**

Mostly coarse herbs, with large, leafy bracted, terminal clusters of flowers, with 2-lipped calyx, 2-lipped corolla, anther cells (sacs) divaricate and nutlets smooth.

1. ***Dracocephalum parviflorum*** Nutt. (AMERICAN DRAGON-HEAD). Slightly pubescent, 3-6 dm. high, usually several or many stemmed from the base; leaves from ovate to lanceolate, serrate or incised; flowers in thick heads or spikes, mostly terminal; corolla light-blue, nearly included; its upper lip emarginate, the lower 3-lobed. Dry gravelly soil.

5. PRUNELLA (SELF-HEAL)

Low herbs with clusters of flowers sessile in axils of round membranaceous floral leaves and forming a close spike or head, tubular-bell-shaped veiny 2 lipped calyx (upper lip broad and flat, truncate, with 3 short teeth, lower 2-cleft), 2-lipped corolla, the entire upper lip erect and arched, lower lip 3-cleft and reflexed-spreading (middle lobe rounded and toothed), and 4 stamens with anthers approximate in pairs.

1. *Prunella vulgaris* L. Leaves ovate-oblong, entire or toothed, petioled, hairy, or smooth; corolla violet or flesh-color (rarely white), not twice the length of the purplish calyx. Woods and fields.

6. SCUTELLARIA (SKULLCAP)

Small perennial herbs with solitary axillary flowers, 2-lipped corolla, inner pair of stamens 2-celled, the outer 1-celled and ciliate, and the nutlets papillose or tuberculate.

1. *Scutellaria Brittoni* Porter (BRITTON'S SKULLCAP). Glandular-pubescent perennial, from rhizomes, branched from the base, 5-20 cm. high; leaves oval to oblong, mostly sessile, obscurely crenulate, noticeably veined below, longer than the internodes; corolla pubescent with enlarged throat, blue. Frequent; sandy banks and draws.

7. PHYSOSTEGIA

Erect glabrous perennial herbs with purple flowers in a bracteate spike, pubescent filaments and smooth ovoid nutlets.

1. *Physostegia parviflora* Nutt. (WESTERN LION'S HEART). Stems 2-5 dm. high, generally simple and rather slender; leaves narrowly ovate to lanceolate, callous-denticulate or serrate; bracts ovate, shorter than the calyx which becomes inflated-globular in fruit; corolla showy, purple, much exceeding the calyx. Margins of ponds and streams.

8. STACHYS (WOUNDWORT)

Ours a hirsute perennial with the flowers in axillary capitate-verticils forming an interrupted spicate-inflorescence, the corolla purple, with slender tube, stamens paired and approximate, and the nutlets smooth.

1. *Stachys palustris* L. (MARSH WOUNDWORT). Pubescent, hirsute or hispid, 2-7 dm. high; leaves ovate to lanceolate, crenate-dentate, 4-8 cm. long, nearly or quite sessile; flowers crowded; corolla purple, its tube scarcely exceeding the calyx-teeth. Wet bottom lands.

LX. SOLANACEÆ (NIGHTSHADE FAMILY)

Herbs (rarely shrubs) with alternate leaves, regular 5-parted sympetalous flowers, 5 stamens on the corolla, a single style, and a 2-celled ovary becoming a many-seeded pod or berry.

* Fruit a fleshy berry, corolla wheel-shaped.

1. *Solanum*. Calyx unchanged in fruit, anthers connected into a cylindrical cone and opening by a terminal hole.

2. **Physalis**. Calyx becoming much enlarged and inclosing the fruit; anthers unconnected.

* * Fruit a dry pod; corolla funnel-form.

3. **Datura**. Calyx tubular-prismatic, 5-toothed.

1. SOLANUM (NIGHTSHADE)

Herbs or shrubs with wheel-shaped corolla, protruding anthers converging around the style and opening by terminal pores, and fruit a berry. (See *Plant Relations*, p. 26, Fig. 21; also *Plant Structures*, p. 198, Fig. 167a.)

* Not at all prickly; anthers blunt.

+ Low and generally spreading; cymes 1-3 flowered.

1. **Solanum triflorum** Nutt. (CUT-LEAVED NIGHTSHADE). Nearly glabrous, branched and more or less spreading; leaves oblong, pinnately lobed, the sinuses deep and rounded; corolla white, small, nodding, longer than the 5-parted calyx; berry green, 8-10 mm. in diameter. Abundant in waste ground and on the plains.

+ + Erect herbs.

2. **Solanum nigrum** (COMMON NIGHTSHADE). Low, much branched and spreading, nearly smooth; leaves ovate, wavy-toothed; flowers white, in small umbel-like lateral clusters; berries globular, black. Commonly introduced in waste grounds.

3. **Solanum tuberosum** (POTATO). Erect; leaves pinnate, of several ovate leaflets with minute ones intermixed; flowers blue or white; berries globular, green. Cultivated from Chili for the tubers. (See *Plant Relations*, p. 76, Fig. 67.)

* * Prickly; anthers acute.

4. **Solanum rostratum** Dunal (BEAKED NIGHTSHADE). Yellowish-hoary with a dense stellate-pubescence and armed with numerous yellow prickles; 3-7 dm. high; leaves once or twice pinnatifid; corolla yellow, 2-3 cm. broad; stamens dissimilar, the lowest one larger and with an incurved beak; fruit inclosed by the close-fitting and strikingly spiny calyx. Sandy plains.

2. PHYSALIS (GROUND-CHERRY)

Herbs with simple toothed or lobed leaves, mostly solitary axillary drooping flowers, producing large juicy berries inclosed in an inflated reticulate-veined, husk-like calyx.

* Viscidly glandular pubescent.

1. **Physalis rotundata** Rydb. (ROUND-LEAVED GROUND-CHERRY). Coarse prostrate or spreading perennials, with numerous, forked, zigzag branches; leaves cordate-orbicular, somewhat toothed, on short, winged petioles; corolla greenish-yellow with a brownish center, about 15 mm. broad; fruiting calyx large, ovoid, and slightly sunken at base.

* * Pubescent not viscid-glandular.

2. **Physalis lanceolata** Michx. (PRAIRIE GROUND-CHERRY). Glabrous or pubescent with mostly simple hairs; slender, erect, sparingly branched, 1-4 dm. high; leaves with entire or undulate margin, oblong-ovate to narrowly lanceolate, tapering into the short petiole; corolla yellowish with a darker center, 12-16 mm. broad; berry greenish-yellow. Plains and cañons.

3. **Physalis Fendleri** Gray (FENDLER'S GROUND-CHERRY). Obscurely glandular or merely pruinose puberulent, 1-3 dm. high; leaves small, ovate, coarsely sinuate-toothed, with abrupt or sub-cordate base; corolla yellow with brownish center; berry yellow. Plains and cañons southward.

3. **DATURA** (JIMSON-WEED. THORN-APPLE)

Rank weeds with ovate leaves, large showy flowers in the forks of the branching stem, prismatic and toothed calyx, funnel-form corolla with large and spreading plaited border, a 2-lipped stigma, and fruit a globular prickly pod.

1. **Datura Stramonium**. Smooth with green stem; leaves sinuate-toothed or angled; corolla white, 6-8 cm. long; lower prickles of the pod usually shorter. Waste ground. From Asia.

2. **Datura Tatula**. Mostly taller; stem purple; corolla pale violet-purple; prickles of the pod nearly equal. Waste ground. From tropical America.

LXI. **SCROPHULARIACEÆ** (FIGWORT FAMILY)

Herbs with 2-lipped or less irregular corolla, 4 unequal stamens (sometimes 2 or 5) on the corolla-tube, a single style and a superior 2-celled ovary becoming a many-seeded pod.

* Stamens 5.

1. **Verbascum**. Corolla rotate; filaments bearded.

** Stamens 2.

2. **Synthyris**. Corolla wanting or unequally 2 or more lobed or cleft; calyx 4-lobed or cleft; leaves alternate.

3. **Veronica**. Corolla rotate, 4-lobed; leaves opposite.

*** Stamens 5, only 4 anther bearing.

4. **Pentstemon**. Corolla tubular or funnel-form; sterile stamen as long as the others.

**** Stamens 4, with a rudiment of the fifth, as a scale or gland.

5. **Scrophularia**. Corolla globular saccate, unequally 5-lobed; the fifth stamen represented by a scale on the upper side of the corolla.

6. **Collinsia**. Corolla 2-lipped, the middle lobe of the lower lip sac-like and inclosing the stamens; the fifth stamen represented by a gland at the base of the corolla.

***** Stamens 4, not inclosed by the upper lip of the corolla.

7. **Mimulus**. Corolla 2-lipped, the upper lip 2- and the lower 3-lobed; calyx prismatic, 5-angled and 5-toothed.

***** Stamens 4, ascending under the upper lip and inclosed by it.

+ Anther sacs unequal or dissimilar—one affixed by the middle, the other hanging by its apex.

8. **Castilleja**. Calyx tubular; upper lip of corolla much longer than the lower.

9. **Orthocarpus**. Calyx tubular-campanulate; upper lip scarcely exceeding the lower.

+ + Anther sacs similar and parallel.

10. **Pedicularis**. Upper lip long and arched, beak (if any) short; calyx cleft on the lower side.

11. **Elephantella**. Upper lip strongly arched and prolonged into a long slender upturned beak, calyx 5-toothed.

1. VERBASCUM (MULLEIN)

Tall herbs with alternate leaves (those of the stem sessile or decurrent), large terminal spikes of flowers, 5-parted calyx, wheel-shaped 5-lobed corolla, 5 stamens with woolly filaments, style flattened at tip, and a globular pod.

1. **Verbascum Thapsus** L. (COMMON MULLEIN). Densely woolly throughout; stem tall and stout, simple, winged by the decurrent bases of oblong leaves, flowers yellow (rarely white) in a prolonged and very dense cylindrical spike. Fields and roadsides. From Europe. (See *Plant Relations*, p. 44, Fig. 36.)

2. SYNTHYRIS (SYNTHYRIS)

Low herbs, with leaves mostly radical and the stems bracteate-scapes, flowers spicate, and fruit a compressed emarginate capsule.

1. **Synthyris Wyomingensis** (Aven Nelson) Heller (WYOMING SYNTHYRIS). Puberulent, 1-3 dm. high; stems 1 or more from the crown of the short rootstock; radical leaves petioled, ovate to oblong, crenate-dentate, rounded or sub-cordate at base; stem-leaves small and sessile; calyx cleft to the base on the outer side, into 2 or 3 lobes on the inner; corolla wanting; stamens twice as long as the calyx; capsule puberulent, protruding from the cleft side of the calyx. Frequent; moist valleys and slopes.

2. **Synthyris alpina** Gray (ALPINE SYNTHYRIS). Nearly glabrous, except for the woolly spike, 5-15 cm. high; leaves oval or sub-cordate, crenate-dentate, on a petiole generally longer than the blade; no stem-leaves; bracts and lanceolate sepals woolly on the margins; corolla purple, its broad upper lip twice the length of the calyx, the 2-3-parted lower one small and included. Frequent in the higher mountains.

3. VERONICA (SPEEDWELL)

Herbs with opposite alternate leaves, blue or white flowers, 4-parted calyx, wheel-shaped corolla with 4-parted border, 2 protruding stamens, and a flattened pod obtuse or notched at apex.

* Leaves opposite; flowers in axillary racemes, pale blue.

1. **Veronica Americana** Schwein (AMERICAN BROOKLIME). Smooth, decumbent at base, then erect, 2-3 dm. high; leaves mostly petioled, ovate or oblong, serrate, truncate or slightly heart-shaped at base; pod inflated, round. Brooks and ditches.

** Leaves opposite; flowers in a terminal raceme.

2. **Veronica serpyllifolia** L. (THYME-LEAVED SPEEDWELL). Much branched at the creeping base, nearly smooth, branches ascending, simple, 5-10 cm. high; leaves ovate or oblong, obscurely crenate, the lowest petioled and rounded, the upper passing into lanceolate bracts; flowers whitish or pale blue with deeper stripes; pods flat, rounded, broader than long, obtusely notched. Moist banks.

*** Leaves mostly alternate; flowers appearing axillary and solitary.

3. *Veronica peregrina* L. (NECKWEED. PURSLANE SPEEDWELL). Nearly smooth or puberulent, erect, 1-2 dm. high, branched; lowest leaves petioled, oval-oblong, toothed, the others sessile; upper leaves oblong and entire, longer than the almost sessile whitish flowers; pod round, slightly notched. In damp soil.

4. PENTSTEMON (BEARD-TONGUE)

Herbs often branching at base, with opposite leaves (upper sessile and mostly clasping), generally showy flowers in a terminal cluster, 5-parted calyx, tubular to bell-shaped more or less inflated 2-lipped corolla, upper lip 2-lobed and lower 3-cleft, and 4 stamens with anthers and a fifth represented by a filament which is usually more or less bearded.

* Perfectly glabrous throughout; sterile filaments bearded at summit.

+ Anther sacs not confluent; corolla scarlet strongly bilabiate.

1. *Pentstemon Torreyi* Benth. (TORREY'S BEARD-TONGUE). Glabrous and glaucous, slender, often 1 m. high; leaves from oblong below to narrowly linear above; thyrsus strict, often half the length of the plant; sepals ovate, very short; corolla scarlet, gradually dilated upward, slightly or not at all bearded in the throat and on the sterile filament; the anthers protruding from the long upper lip. In the mountains.

+ + Anther cells not confluent; corolla blue or purple, abruptly enlarged above the short tube, about 3 cm. long.

2. *Pentstemon glaber* Pursh (WESTERN BEARD-TONGUE). Somewhat glaucous; stems several, ascending, stoutish, 2-5 dm. high; leaves from ovate-lanceolate to oblong, acute; flowers numerous, in an elongated thyrsus; sepals broadly ovate, scarious margined, abruptly acuminate; corolla blue or purple, slightly 2-lipped with rounded lobes; anthers and sterile filament usually slightly bearded. Sandy soil.

+ + + Anther cells confluent, becoming explanate; corolla mostly less than 25 mm. long.

3. *Pentstemon secundiflorus* Benth. (TALL BEARD-TONGUE). Slender and erect, 4-8 dm. high; radical leaves spatulate, the cauline narrowly lanceolate; thyrsus very long and narrow, somewhat one-sided; sepals ovate to oblong, the entire margins scarious; corolla about 25 mm. long, its tube twice as long as the sepals, abruptly dilated into the bell-shaped throat, the lobes of the spreading lips sub-orbicular; anthers glabrous and the sterile filament nearly or quite so. Cañons and gravelly ridges.

4. *Pentstemon acuminatus* Dougl. (SHARP-LEAVED BEARD-TONGUE). Glauous, 2-4 dm. high, erect; leaves thick, slightly cartilaginous on the margins, acuminate; the lower petioled, oblong or spatulate; the upper ovate to lanceolate and sessile; thyrsus narrow, often few-flowered and somewhat one-sided; sepals lanceolate, acute; corolla blue shading to violet, gradually dilated upward; sterile filament flattened and bearded at apex. Frequent; stony or gravelly slopes.

5. *Pentstemon angustifolius* Pursh (BLUE BEARD-TONGUE). Glaucous 1-2 dm. high; leaves long, broadly linear; sepals scarious on the margins, narrowly ovate, abruptly acuminate; corolla light blue, gradually dilated, 20 mm. or less in length; sterile filament densely short-bearded. Plains.

** More or less pubescent or glandular, at least above; corolla somewhat bearded in the throat.

+ Flowers in a narrow thyrsus.

6. *Pentstemon cristatus* Nutt. (CRESTED BEARD-TONGUE). Viscid and villous-pubescent above, 1-2 dm. high; the stem leafy; leaves mostly oblong and acute; thyrsus dense and leafy; sepals narrow; corolla light red or pinkish, funnel-form, about 25 mm. long, long-bearded in the throat and the sterile stamen inordinately yellow comose. Cañons and plains.

7. *Pentstemon humilis* Nutt. (ROCKY MOUNTAIN BEARD-TONGUE). Glabrous except the slender thyrsus, 1-2 dm. high; stems tufted; leaves largely basal, oblong to lanceolate, usually some of them denticulate; inflorescence narrow, the peduncles 2-5 flowered; sepals ovate-lanceolate; corolla blue, narrowly funnel-form, 12-15 mm. long; hairy on the lower lip; sterile filament yellow-bearded at tip. Rocky cañons and slopes.

+ + Flowers in open or in capitate verticils.

8. *Pentstemon procerus* Dougl. (SMALL-FLOWERED BEARD-TONGUE). Nearly glabrous, some minute puberulence in the inflorescence; stems usually several, ascending or erect, 15-25 cm. high; leaves oblong-lanceolate to linear; flowers in 1-3 capitate clusters; sepals from ovate to lanceolate, with scarious margins and more or less lacerate tips; corolla small, nearly tubular, only 10-13 mm. long, bearded within, purplish-blue. Frequent in moist grassy valleys.

9. *Pentstemon stenosepalus* (Gray) Rydb. (TIMBERLINE BEARD-TONGUE). Viscid-pubescent above, stems tufted, ascending, 3-5 dm. high; leaves thickish, oblong to lanceolate; flowers in 2-5 axillary cymes; sepals lanceolate-acuminate; corolla dull white or purplish, gibbously dilated above the short tube, 2-3 cm. long; sterile filament bearded at the tip. In the upper limit of trees.

5. SCROPHULARIA (FIGWORT)

Tall herbs with mostly opposite leaves, small greenish-purple or lurid flowers in a loose terminal cluster, deeply 5-cleft calyx, corolla with a somewhat globular tube (4 upper lobes of the short border erect, the lower one spreading), and 4 declined stamens.

1. *Scrophularia occidentalis* (Rydb.) Bicknell (WESTERN FIGWORT). Glandular-pubescent above; stem 4-sided, 5-10 dm. high; leaves from ovate to lanceolate, sharply serrate; corolla conspicuously gibbous. Wet banks.

6. COLLINSIA

Slender branching herbs with opposite leaves, small flowers in clusters in the axils of the leaves, deeply 5-cleft calyx, deeply 2-lipped corolla saccate or bulging at base, upper lip 2-cleft with lobes turned backward, and middle lobe of the 3-cleft lower lip sac-like and inclosing the 4 declined stamens and style.

1. *Collinsia parviflora* Dougl. (SMALL-FLOWERED COLLINSIA). Obscurely puberulent, branched from the base, the slender stems soon spreading, 5-15 cm. long; leaves linear-oblong; calyx-lobes triangular-lanceolate, nearly equaling the blue and white corolla. Rich loose soil, cañons and woods.

7. MIMULUS (MONKEY-FLOWER)

Herbs (in the species listed) growing in water or wet places, with opposite leaves, showy yellow axillary flowers and 2-lipped corollas.

1. *Mimulus Langsdorfii* Sims (MARSH MONKEY-FLOWER). Nearly glabrous, from 1 or 2 to several dm. high, often coarse and succulent; leaves ovate or oblong, from entire to dentate or even lyrate; corolla deep-yellow, large, frequently dark dotted and the lower lip blotched. Borders of rivulets and marshes.

2. *Mimulus Jamesii* T. and G. (JAMES'S MONKEY-FLOWER). Glabrate; stems spreading or creeping; leaves sub-orbicular, entire or denticulate; flowers on slender axillary pedicels, light yellow, about 12 mm. long; seeds shining and smoothish. In the mountains.

8. CASTILLEJA (INDIAN PAINT-BRUSH)

Herbs with alternate entire or cut-lobed leaves, floral leaves usually dilated and colored and more showy than the yellow or purplish spiked flowers, tubular flattened and usually 2-cleft, 2-lipped corolla with tube included in the calyx, upper lip long and narrow and arched and inclosing the 4 unequal stamens and lower lip short and 3-lobed.

* Leaves and bracts more or less cleft or lobed.

1. *Castilleja collina* Aven Nelson (WYOMING PAINT-BRUSH). Finely puberulent with some white woolly hairs at the base of the leaves, tufted or many-stemmed from a short caudex, 25 cm. high; leaves 2-4 cm. long, dark green, cleft into linear lobes or broader; bracts as large as the leaves, more freely cleft, scarlet red; calyx unequally cleft; corolla yellowish, galea longer than the tube; the lip very short, 3-toothed.

2. *Castilleja linearifolia* Benth. (NARROW-LEAVED PAINT-BRUSH). More or less pubescent upward, the stems tall and slender, 4-8 dm. high; leaves linear, entire, or cleft into linear lobes, especially above; bracts 3-parted, red or crimson as is also the unequally cleft calyx; corolla 4-5 cm. long, slender, its narrow galea curved and long exserted, about equaling the tube. Moist woods and stream banks.

** All the leaves entire.

3. *Castilleja integra* Gray (MEXICAN PAINT-BRUSH). Cinerous-pubescent, stoutish, 15-25 cm. high; leaves all entire, broadly linear, 3-6 cm. long, bracts entire or incised, red or rose-color; corolla about 3 cm. long, its galea shorter than the tube, the lip with 3 short callous teeth. Dry ground.

9. ORTHOCARPUS

Much like *Castilleja*, but the lips of the corolla sub-equal.

1. *Orthocarpus luteus* Nutt. (YELLOW ORTHOCARPUS). A small pubescent or somewhat viscid annual, 1-2 dm. high; stem strict; leaves linear or lanceolate, sometimes 3-cleft; corolla golden yellow, 10-12 mm. long, 2-3 times as long as the calyx; the lip saccate and the galea obtuse, short, and straight. Plains and mountain valleys.

10. PEDICULARIS (LOUSEWORT)

Herbs with pinnately crenate or pinnatifid leaves, those of the flower-cluster bract-like, rather large flowers in a spike, calyx variously cleft, strongly 2-lipped corolla, upper lip arched and flattened and often beaked at apex, lower lip 3-lobed and 2-crested above, and 4 stamens under the upper lip.

1. *Pedicularis crenulata* Benth. (MEADOW LOUSEWORT). At first villous-pubescent, becoming glabrate; stems numerous, tufted, ascending, 2-3 dm. high; leaves narrowly oblong, crenate and finely crenulate on the larger crenations; spike short and dense; corolla purplish, 15-20 mm. long, the galea short, 2-toothed and somewhat incurved. Wet grassy places.

2. **Pedicularis bracteosa** Benth. (BRACKETED LOUSEWORT). Glabrous except on the pedunculate spike, 3-5 dm. high, rather stout; leaves large, pinnately parted or divided and the segments again deeply cut-toothed; bracts ovate, acuminate; corolla pale-yellow, about 2 cm. long and longer than the bracts, its galea much longer and larger than the lip. Open woods in the mountains.

11. ELEPHANTELLA

Like *Pedicularis*, but the calyx obliquely campanulate, the upper lip strongly arched and elongated into a narrow upturned beak.

1. **Elephantella Groenlandica** (Retz.) Rydb. (LONG-BEAKED ELEPHANTELLA). A glabrous perennial, 2-5 dm. high, rather slender and erect; leaves lanceolate, deeply pinnatifid and segments again pinnatifid or toothed; spike naked; corolla red or purple, its tube included in the 5-toothed calyx; beak of galea about twice as long as the rest of the corolla. Marshy or wet ground in the mountains.

LXII. PLANTAGINACEÆ (PLANTAIN FAMILY)

Herbs with a basal cluster of ribbed leaves, and naked stems terminating in spikes of 4-parted sympetalous flowers.

1. PLANTAGO (PLANTAIN)

Herbs with 4 sepals, wheel-shaped and 4-lobed corolla, 4 protruding stamens, a single slender style with long hairy stigma, and a superior 2-celled pod opening by a lid.

* Leaves broad and strongly ribbed, smooth.

1. **Plantago major** L. (COMMON PLANTAIN). Smooth or somewhat hairy; leaves ovate, oblong, oval or slightly heart-shaped, often toothed, abruptly narrowed into a channeled petiole, the strong ribs distinct to the base; spike dense, obtuse; pod ovoid, lid opening near the middle; seeds reticulated. Roadsides and near dwellings. Introduced from Europe.

2. **Plantago eriopoda** Torr. (SALINE PLANTAIN). Glabrous except for more or less yellowish-brown wool among the bases of the leaves; leaves rather thick and fleshy, 5-7-nerved, petioled, mostly oblong and entire; spike long; sepals oblong-obovate, scarious except the midrib; capsule longer than the calyx, its lid opening below the middle. Frequent on moist alkaline ground.

** Leaves narrow and not strongly ribbed; plant more or less white-woolly.

3. **Plantago Purshii** R. & S. (PURSH'S PLANTAIN). A silky white-woolly annual, 7-15 cm. high; leaves linear, 3-nerved, narrowed into margined petioles; spike dense, very woolly; the narrow bracts about equaling the flowers; capsule about twice as long as the calyx, opening near the middle. Dry sandy slopes.

LXIII. CAPRIFOLIACEÆ (HONEYSUCKLE FAMILY)

Shrubs or herbs with opposite leaves, tubular or rotate 4- or 5-lobed corolla, 4 or 5 stamens on the corolla-tube, and an inferior 4- or 5- (or 2- or 3-) celled ovary becoming a berry, stone-fruit or pod.

* Corolla wheel-shaped or urn-shaped ; stigmas sessile or nearly so ; flowers in terminal flat-topped clusters ; shrubs.

1. **Sambucus**. Leaves pinnately compound.

2. **Viburnum**. Leaves simple.

* * Corolla funnel-form, bell-shaped or tubular ; style slender.

+ Small trailing evergreen with terminal twin-flowers.

3. **Linnæa**. Flowers long-peduncled.

+ + Erect shrubs.

4. **Symphoricarpos**. Corolla bell-shaped and regular ; berry 2-seeded.

5. **Lonicera**. Corolla tubular and more or less irregular ; berry several-seeded.

1. **SAMBUCUS** (ELDER)

Shrubby plants with pinnate leaves, serrate leaflets, numerous small white flowers in large clusters, calyx-lobes minute or wanting, urn-shaped corolla with broadly spreading 5-cleft border, 5 stamens, and a berry-like juicy fruit.

1. **Sambucus Canadensis** L. (COMMON ELDER). Stems scarcely woody, 1-3 m. high, with white pith ; leaflets 5-11, oblong, mostly smooth, the lower often 3-parted, flower clusters flat ; fruit black-purple. Rich open soil.

2. **Sambucus pubens** Michx. (RED-BERRIED ELDER). Stems woody, .5-3 m. high with warty bark and brown pith ; leaflets 5-7, ovate-lanceolate, downy beneath ; flower clusters convex or pyramidal ; fruit bright red. Rocky woods.

3. **Sambucus melanocarpa** Gray (BLACK-BERRIED ELDER). Pubescent when young, becoming glabrous, low, often killing back to the ground each winter, mostly less than 1 m. high ; leaves 5-9 foliate, sharply serrate ; cymes convex, as broad as high ; flowers white ; fruit black, without bloom. Moist rocky cañons in the mountains.

2. **VIBURNUM** (CRANBERRY-TREE)

Shrubs with simple leaves, white flowers in flat clusters, 5-toothed calyx, deeply 5-lobed spreading corolla, 5 stamens, and a berry-like fruit.

1. **Viburnum pauciflorum** Pylaie (FEW-FLOWERED CRANBERRY-TREE). A nearly glabrous straggling shrub, 5-15 dm. high ; leaves mostly oval, irregularly dentate or slightly lobed ; the small cymes terminating short lateral branches ; flowers white ; fruit light red, globose, acid and edible ; the stone flat, orbicular.

3. **LINNÆA** (TWIN-FLOWER)

A prostrate perennial, with slender creeping woody stems, evergreen leaves, regular 5-merous calyx and corolla, the latter funnel-form, stamens 4, and ovary 3-celled, only 1 ovule maturing.

1. **Linnæa Americana** Forbes (AMERICAN TWIN-FLOWER). Slightly pubescent, usually forming dense low beds or patches ; leaves obovate to orbicular, firm and dark green ; peduncles slender, with a pair of bracts at summit and from the axil of each a filiform 2-bracted, 1-flowered pedicel ; flowers nodding ; corolla purple or rose-colored, about 10 mm. long ; berry nearly globose. Coniferous woods.

4. SYMPHORICARPOS (SNOWBERRY)

Low branching upright shrubs with short-petioled leaves, white or rose-tinged flowers in spikes or axillary clusters, short calyx teeth, bell-shaped regular 4- or 5-lobed corolla with as many short stamens in its throat, and fruit a berry.

* Flowers in axillary spicate clusters; corolla campanulate, about 6 mm. long, densely hirsute-villous within.

1. *Symphoricarpos occidentalis* Hook. (WOLF-BERRY). Somewhat pubescent, freely branched, 3-7 dm. high; leaves ovate to oval, often undulate toothed, 2-5 cm. long; flowers often crowded; the corolla cleft to the middle; pinkish-white; berry white, sub-globose.

** Flowers axillary; corolla tubular-funnel-form, nearly glabrous within.

2. *Symphoricarpos oreophilus* Gray (HILLSIDE SNOWBERRY). From glabrous to softly pubescent, rather slender, 3-6 dm. high; leaves broadly ovate to oblong, entire or nearly so; flowers few in the axils; corolla white, 10-12 mm. long; berry large (about 8 mm. long), ovoid, white. Open woods on hillsides.

5. LONICERA (HONEYSUCKLE)

Erect or climbing shrubs with entire leaves, often showy and fragrant flowers, very short calyx teeth, tubular or funnel-form corolla, 5 stamens, and a 2-3-celled ovary becoming a berry.

1. *Lonicera involucrata* (Rich) Banks (GROUSE-BERRY). Generally somewhat pubescent, erect, growing in clumps, 5-25 dm. high; leaves from ovate to oblong-lanceolate, 4-8 cm. long, petioled, bracts ovate-cordate, enlarging in fruit, becoming purplish-black and inclosing the berry; flowers usually paired, axillary; corolla yellowish, viscid-pubescent; berry globose, about 8 mm. in diameter, black, with a sickening bitter taste.

LXIV. VALERIANACEÆ (VALERIAN FAMILY)

Perennial herbs with opposite leaves, panicked or cymose flowers, a 5-lobed corolla, 1-4 stamens, an inferior 3-celled ovary, becoming an indehiscent 1-seeded fruit.

1. VALERIANA

Herbs with large rank-smelling roots or rhizomes, cymose flowers, calyx-limb of 5-15 setiform lobes, tubular or funnel-form corolla, 3 stamens inserted on the corolla-tube, and a 1-seeded nerved fruit.

1. *Valeriana edulis* Nutt. (EDIBLE VALERIAN. TOBACCO-ROOT). Glabrous or nearly so; root perpendicular, large, fusiform and branching below; stem erect, few-leaved, 3-8 dm. high; basal leaves parallel-veined, large, entire or sparingly pinnately lobed; stem-leaves sessile, pinnately parted into narrow divisions; flowers in an elongated panicle of small cymes, yellowish-white; fruit ovate, shorter than the fully developed plumose calyx-segments. Wet banks.

2. *Valeriana septentrionalis* Rydb. (NORTHERN VALERIAN). Glabrous; the erect stems from horizontal rootstocks, 2-5 dm. high; root-leaves petioled, entire, from spatulate to oval; stem-leaves about 3-pair, pinnately lobed or parted into 5-7 divisions; flowers white, in a crowded cyme, more open in fruit; fruit glabrous, compressed, about 3 mm. long. Moist wooded hillsides.

LXV. CAMPANULACEÆ (CAMPANULA FAMILY)

Herbs with alternate leaves, bell-shaped or wheel-shaped usually blue and showy corolla, 5 separate stamens, a single style and a 3-5-celled ovary becoming a many-seeded pod.

1. **Specularia**. Flowers sessile in the axils of the roundish clasping leaves; filaments hairy.

2. **Campanula**. Flowers on slender stalks or in terminal spikes; filaments smooth.

1. SPECULARIA (VENUS LOOKING-GLASS)

Low herbs with axillary blue or purplish flowers, 5-lobed calyx, wheel-shaped 5-lobed corolla, hairy filaments, and a 3-celled oblong pod opening on the side by 3 holes.

1. **Specularia perfoliata** (L.) A. DC. Somewhat hairy, 1-4 dm. high; leaves roundish or ovate, clasping by the heart-shaped base, toothed; flowers sessile, solitary or 2-3 together, only the upper one with a conspicuous corolla; pod opening rather below the middle. Sterile open ground.

2. CAMPANULA (BELLFLOWER)

Herbs with terminal or axillary flowers, 5-cleft calyx, usually bell-shaped 5-lobed corolla, broad filaments and a 3- or 5-celled short pod opening on the side by as many holes. (See *Plant Relations*, p. 19, Fig. 13; p. 80, Fig. 74a. Also *Plant Structures*, p. 228, Fig. 210a.)

* Flowers few, on slender stalks; stem-leaves narrow.

1. **Campanula rotundifolia** L. (HAREBELL. BLUE-BELL). Mostly smooth, slender, branching, 1-3 dm. high, 1-10 flowered; basal leaves round-heart-shaped or oval, long-petioled, early withering away; stem-leaves numerous, linear or narrowly lanceolate, entire, smooth; calyx-lobes awl-shaped; corolla bright blue; style straight; pod nodding; its openings below the middle. Shaded rocky ground.

* * Flowers solitary terminal; leaves all narrow.

2. **Campanula Parryi** Gray (PARRY'S BELLFLOWER). Glabrous, slender, 1-3 dm. high; leaves denticulate, from spatulate-lanceolate to nearly linear; flowers peduncled, erect, rather large; corolla blue, shading to purple, shaped like a funnel without the tube, cleft nearly half its length; only slightly longer than the linear calyx-lobes. Wet grassy valleys.

LXVI. CICHORIACEÆ (CHICORY FAMILY)

Like *Compositæ*, but all the flowers of the head with strap-shaped corollas (ligules).

* Flowers yellow.

+ Stemless; heads solitary, terminal on naked scapes.

1. **Agoseris**. Scape solid; achenes 10-ribbed, short beaked.

2. **Taraxacum**. Scape hollow, achene 4-5 angled, spinulose at summit, with very long slender beak.

+ + Stems usually leafy ; heads paniculate or corymbose.

3. **Crepis**. Leaves entire to pinnatifid ; achenes narrowed at summit but not beaked.

* * Flowers blue.

4. **Lactuca**. Stems leafy ; achenes flattened, nerved and short-beaked.

1. AGOSERIS

Acaulescent herbs with rosulate nearly sessile leaves, naked scape, imbricated involucre of unequal bracts, flat receptacle, truncate 5-toothed rays, slender style-branches, and a copious pappus of slender white bristles.

1. **Agoseris glauca** (Pursh) Greene (LARGE-FLOWERED AGOSERIS). Glabrous and somewhat glaucous ; leaves from oblong-lanceolate to nearly linear, entire to somewhat pinnatifid ; scape longer than the leaves, 1-3 dm. high ; involucre campanulate, its bracts lanceolate, glabrous, 3-4 cm. broad ; the achene with its stout nerved beak 10-12 mm. long, longer than the scabrous pappus. Moist slopes and valleys.

2. **Agoseris Leontodon** Rydb. (CUT-LEAVED AGOSERIS). Cinerous-pubescent, especially while young, somewhat tufted ; stems slender, ascending, 5-12 cm. long ; leaves lanceolate in outline, more or less lacinate-pinnatifid ; bracts of the involucre lanceolate ; heads only 2-3 cm. broad ; the rays usually purplish externally. Moist valleys.

2. TARAXACUM (DANDELION)

Herbs with basal rosette of pinnatifid leaves, large and solitary heads on slender hollow stems, double involucre (outer short scales, inner long and narrow erect scales in a single row), and an oblong ribbed achene prolonged into a very slender beak bearing the soft white pappus.

1. **Taraxacum Taraxacum** (L.) Karst. Smooth or at first hairy ; outer involucre reflexed ; inner involucre at first erect, but reflexed in fruit and exposing the globular head of pappus. Everywhere. From Europe. (See *Plant Relations*, p. 114, Fig. 113 ; also *Plant Structures*, p. 213, Fig. 187 ; p. 277, Fig. 262 ; p. 278, Fig. 263.)

3. CREPIS (HAWKSBEARD)

Perennials with sparsely leafy stems, often branching, entire or pinnatifid leaves, yellow flowers, soft white pappus, striate achenes narrowed at summit (not beaked).

1. **Crepis glauca** (Nutt.) T. & G. Glabrous and somewhat glaucous, stems nearly or quite leafless, ascending, 2-4 dm. long ; leaves basal from entire to lacinate-pinnatifid, broadly spatulate to lanceolate ; heads few-several, about 2 cm. broad, on long slender peduncles ; bracts of the involucre lanceolate, acute except the outer very short ovate ones ; achene fusiform-cylindric, with 10 well-marked ribs. Moist alkaline soil.

2. **Crepis acuminata** Nutt. Somewhat cinerous-pubescent ; stems 1-several from the crown, 3-5 dm. high ; leaves large, petioled, oblong-lanceolate in outline, deeply and irregularly pinnatifid, long acuminate at apex ; heads small, very numerous in a corymbose-cyme ; involucre glabrous, few-flowered (4-6), its bracts somewhat keeled or thickened at base ; achenes fusiform, longer than the pappus. Frequent on dry stony hills.

4. **LACTUCA** (WILD LETTUCE)

Tall herbs with milky juice, alternate leaves, cylindrical involucre of unequal imbricated bracts, rays truncate-toothed at apex, and ribbed achenes narrowed into a beak which is expanded at summit into a flat disk bearing the abundant pappus.

1. **Lactuca pulchella** (Pursh) DC. (BLUE LETTUCE). A glabrous perennial with slender leafy stem, 2-4 dm. high, simple except the corymbose-panicle of showy blue heads; leaves lanceolate or oblong, entire, toothed or pinnatifid; achenes flat, oblong, 3-4 mm. long, longer than the beak; pappus abundant, soft and white.

LXVII. **COMPOSITÆ** (COMPOSITE FAMILY)

The greatest family of the flowering plants, chiefly blooming in summer and autumn, with flowers collected in a head which is surrounded by a rosette of bracts (involucre), the marginal flowers (rays) usually with strap-shaped conspicuous corollas, the inner flowers (forming the disk) tubular and 5-toothed, calyx in the form of hairs, bristles, teeth, scales, etc. (pappus), 5 stamens united by their anthers, a 2-cleft style, and an inferior ovary becoming a dry seed-like achene. (See *Plant Structures*, p. 275; also p. 276, Fig. 261.)

* Disk flowers yellow; ray not yellow.

+ Receptacle naked; pappus of capillary or rigid scabrous bristles.

1. **Townsendia**. Pappus bristles few, rigid and scabrous; style appendages lanceolate; achenes flattened, with thick margins, those of the ray triangular; rays white, blue or purple.

2. **Erigeron**. Pappus bristles numerous, capillary; style appendages short, rounded; achenes 2-nerved; rays variously colored.

+ + Receptacle chaffy; pappus wanting.

3. **Achillea**. Involucre campanulate, its inner bracts membranous—like the bracts of the receptacle; rays white, short and broad; leaves dissected.

** Disk flowers white or pinkish; rays wanting or (if present) white and inconspicuous.

4. **Chænactis**. Leaves pinnately dissected; pappus of hyaline scales.

5. **Petasites**. Root-leaves large, sagittate; pappus of numerous long white capillary bristles.

*** Ray flowers yellow.

+ Receptacle chaffy; pappus of 2-pointed scales or wanting; achenes more or less 4-angled.

6. **Rudbeckia**. Disk hemispherical or conical, brownish-black; pappus wanting; involucre of spreading leaf-like bracts.

7. **Helianthus**. Disk flat, brownish or dark purple; pappus 2 scarious deciduous scales, involucre of spreading attenuate bracts.

8. **Balsamorhiza.** Disk flat, yellow; pappus none; outer bracts of the broad involucre foliaceous.

+ + Receptacle naked or fimbriate; pappus of 5-12 hyaline scales; achenes turbinate or ob-pyramidal.

9. **Tetraneuris.** Bracts of involucre similar; receptacle naked; mostly caespitose plants with scapose stems, and yellow flowers.

10. **Gaillardia.** Bracts of involucre dissimilar; receptacle with slender fringed bracts; leafy stemmed plants with large yellow rays and disk-flowers becoming brownish.

+ + + Receptacle naked; pappus of numerous capillary bristles; achenes slender; disk yellow.

11. **Stenotus.** Low caespitose, with woody base, narrow alternate leaves, and scapose stems.

12. **Arnica.** Herbs; leaves few, opposite; heads solitary or few, rather large, conspicuously radiate.

13. **Senecio.** Herbs; leaves alternate; heads few to many in a cymose-corymb or panicle; rays few.

1. TOWNSENDIA

Depressed, tufted, or spreading from the branched base, with narrow entire leaves, large heads with numerous rays; the bracts of the involucre imbricated in several series (the outer shorter), the achenes compressed and pubescent with hairs forked at the tip.

* Stemless, depressed, heads medium-sized (15-20 mm. broad).

1. **Townsendia sericea** Hook. (EARLY TOWNSENDIA). Sericeous pubescent, closely appressed to the ground; heads solitary or several (when several crowded), more or less exceeded by the numerous spatulate-linear leaves which form a rosulate cluster about the heads; involucre bracts nearly linear, acute; rays generally white. Exceedingly abundant; plains and foothills; the earliest of the flowers.

* Stems branched from the base; heads large, 3 cm. or more broad.

2. **Townsendia grandiflora** Nutt. (LARGE-FLOWERED TOWNSENDIA). Canescently pubescent, becoming glabrate; the stems ascending, often branching; leaves from spatulate to linear, the uppermost subtending the head; involucre bracts lanceolate, scarious margined; rays violet-purple to white; pappus of disk flowers longer than the achene.

2. ERIGERON (ERIGERON. FLEABANE)

Herbs with entire or toothed alternate leaves, solitary or clustered heads on naked peduncles, narrow and nearly equal involucre scales, variously colored rays, yellow disk, flattened 2-nerved achenes, and pappus of capillary bristles.

* Leaves pedately trifid.

1. **Erigeron trifidus** Hook. (BIRDFOOT ERIGERON). Dwarf and tufted, with short hirsute pubescence; leaves crowded on the numerous crowns or short stems of the depressed caudex, the short blade 3-5-parted into linear oblong divisions which are sometimes again cleft or lobed, on slender hirsute petioles 2-6 times as long as the blade; peduncles slender, usually much surpassing the leaves, mono-

cephalous; involuclral bracts linear; rays numerous, white. Sterile slopes and ridges.

* * Leaves narrow, entire; plants tufted or spreading.

+ Conspicuously hirsute-pubescent; branched-spreading from the crown or crowns of a tap-root.

2. *Erigeron pumilus* Nutt. (LOW ERIGERON). Stems leafy, spreading-assurgent, 7-15 cm. long; basal leaves spatulate-linear; stem-leaves linear; heads 15-20 mm. broad; rays 50-80, white. Sandy plains and valleys.

+ + Pubescence minute; plants green; rays white.

3. *Erigeron Eatonii* Gray (EATON'S ERIGERON). Low and strongly tufted, the numerous short, slender stems and linear leaves crowded on the crowns of the branched woody caudex; leaves 2-5 cm. long, surpassed by the peduncles; heads about 15 mm. broad, usually solitary, sometimes 1 or 2 smaller accessory ones; involucre minutely hirsute, the bracts dark green on the midrib; rays few (15-30). Frequent and abundant on stony gravelly slopes.

4. *Erigeron flagellaris* Gray (RUNNING ERIGERON). More or less branched below, the stems slender and flexuous, spreading, 1-4 dm. long; the lower leaves narrowly oblanceolate, becoming smaller and narrower upward, reduced to bracts above; peduncles naked, monocephalous; rays very numerous and narrow, sometimes pinkish. Moist draws and banks.

+ + + Glandular or granular ciliate-pubescent; rays violet or purple.

5. *Erigeron glandulosus* Porter (GLANDULAR ERIGERON). Stems and leaves crowded on the thick crowns of the caespitose caudex, 10-25 cm. high; leaves from narrowly spatulate to linear, 3-6 cm. long; stems leafy below, naked pedunculate above with a single showy head; rays 40-50. Stony slopes; foothills and mountains.

* * * Leaves large, some of them coarsely toothed, plants erect.

6. *Erigeron Philadelphicus* L. (COMMON FLEABANE). Hairy; stem leafy, branching above, bearing several small heads; leaves thin, oblong, the upper ones smoothish, clasping by a heart-shaped base, mostly entire, the lowest spatulate and toothed; rays innumerable and very narrow, rose-purple or flesh-color. Moist ground.

3. *ACHILLEA* (YARROW)

Perennial herbs with erect stems, finely dissected pinnatifid alternate leaves, small heads in corymbs at the summit of stem and branches, campanulate involuclres of unequal imbricated bracts, yellow disk, and a few broad white rays.

1. *Achillea lanulosa* Nutt. (WESTERN YARROW). Somewhat woolly pubescent, 2-5 dm. high; leaves finely bipinnate; cyme dense and flat-topped; involuclral bracts with green, keeled midrib and thin brownish margins, the chaff on the receptacle membranous. Common; from the plains to the mountain-tops.

4. *CHÆNACTIS*

Perennial herbs with alternate dissected leaves, rather large rayless heads in open irregular terminal cymes.

1. *Chænactis Douglasii* H. & A. (DOUGLAS'S CHÆNACTIS). More or less whitened with short woolly floccose pubescence, sometimes becoming glabrate, branched from the base and sparingly upward, 1-4 dm. high; leaves bipinnately

dissected, the lobes from linear to short oblong ; heads often nearly 2 cm. high ; involucre campanulate, its bracts slightly or not at all imbricated ; achenes linear, pubescent ; the pappus of thin fringed glistening scales. Open stony and sterile slopes.

5. PETASITES

Perennials from thick rhizomes, with scaly scapose stems, large radical leaves on stout petioles and white flowers in corymbiform racemes.

1. *Petasites sagittata* (Pursh) Gray (SWEET COLTSFOOT). Somewhat woolly-pubescent ; stems erect, 1-3 dm. high, with several alternate erect foliaceous lanceolate bracts ; leaves large, deltoid-oblong to reniform-hastate, very white-tomentose beneath, developing a little later than the stems, becoming 1-3 dm. long ; involucre campanulate, its bracts in a single series ; corollas very slender, the outer with a narrow white ligule. Marshy mountain meadows.

6. RUDBECKIA (CONE-FLOWER)

Herbs with alternate leaves, showy terminal heads, leaf-like and spreading involucre scales, long yellow rays, hemispherical to oblong or conical dark disk, with short chaff, 4-sided smooth achenes, and no pappus.

1. *Rudbeckia flava* Moore (WESTERN BLACK-EYED SUSAN). Hirsute or strigose ; stems simple, straw-colored, purple-dotted, 2-5 dm. high ; leaves oblong, lanceolate to nearly linear, tapering into a margined petiole ; heads solitary, long-peduncled ; involucre bracts oblong-linear ; rays about 25 mm. long, linear-oblong, yellow. Frequent ; plains and foothills.

2. *Rudbeckia ampla* Aven Nelson (LARGE CONE-FLOWER). Perennial, from horizontal rootstocks ; stems erect and branched, striate, 1-2 m. high ; leaves large, compoundly trifoliate ; leaflets ovate, 3-cleft, coarsely and irregularly serrate ; heads large, terminating the branches, involucre bracts ovate to oblong ; rays 6-12, conspicuous, 3-5 cm. long ; disk cylindrical ovate, 2-4 cm. high. Moist coves.

7. HELIANTHUS (SUNFLOWER)

Rather coarse herbs, the following being annuals with 3-nerved leaves alternate above and opposite below, the showy peduncled heads which terminate the branches having yellow rays and a broad flat brownish or purplish disk, an involucre of spreading attenuate bracts, and thick oblong somewhat 4-angled achenes.

1. *Helianthus annuus* L. (COMMON SUNFLOWER). Roughish pubescent or hispid ; under favorable conditions becoming large and freely branched ; leaves broadly ovate, 1-2 dm. long ; heads in the wild plant 6-12 cm. broad ; bracts of the involucre ovate or narrower, ciliate-hispid ; bracts or chaff of the receptacle 3-cleft. Waste grounds and on the plains. From this has been derived the much larger cultivated forms.

2. *Helianthus petiolaris* Nutt. (PRAIRIE SUNFLOWER). Smaller, quite similar, hirsute, sparingly branched above ; leaves mostly ovate-lanceolate, 4-8 cm. long on slender petioles, entire or nearly so ; heads smaller, only 3-5 cm. broad. Sandy plains and river bottoms.

8. BALSAMORRHIZA (BALSAM-ROOT)

Perennials from thick deep-set balsamic scented roots, with tufted radical long-petioled leaves, and few-leaved or scapose erect stems bearing large solitary heads of yellow flowers.

1. **Balsamorhiza sagittata** Nutt. (ARROW-LEAVED BALSAM-ROOT). Root large, woody, vertical, often 1 m. in length; leaves crowded on the crown, cordate-oblong to sagittate, 1-2 dm. long, on longer petioles, silvery-canescenscent; scape equaling or surpassing the leaves; heads 8-10 cm. broad. Moist rocky ravines and slopes.

9. TETRANEURIS

Low perennials, the following caespitose, with crowded narrow radical leaves and scapose monocephalous stems, involucre of nearly equal bracts, conspicuous yellow 4-nerved (whence the name) rays, and silky-villous achenes.

1. **Tetraneris acaulis** (Pursh) Greene (STEMLESS TETRANEURIS). Silvery silky-pubescent; caespitose, often in broad mats; leaves crowded on the crowns of the branched caudex, spatulate-linear, much exceeded by the 7-12-cm.-long scapes; heads 20-25 mm. broad; involucre somewhat woolly; rays 10-15; pappus of few awned scales. Dry rocky soil.

2. **Tetraneris acaulis caespitosa** Aven Nelson. More depressed, inordinately silky-villous throughout; heads smaller and scarcely rising above the leaves of the broad mat. Sandy-clay draws and ravines.

3. **Tetraneris simplex** Aven Nelson (SIMPLE TETRANEURIS). Appressed pubescent; plants singly, rarely in small tufts; caudex short, of 1 or more crowns on a vertical tap-root; leaves linear-spatulate; scapes singly from the crown, 15-25 cm. high; heads large, 2.5-4 cm. broad, silky-lanate on the involucre. Sandy valleys and plains.

4. **Tetraneris Torreyana** (Nutt.) Greene (TORREY'S TETRANEURIS). Strongly caespitose-tufted; the numerous branches of the caudex thick and inordinately clothed by the imbricated bases of the leaves of the previous years, these involved in a dense hirsute-wool; leaves nearly glabrous, bright green, closely and conspicuously resinous impressed-punctate, linear, 4-7 cm. long, somewhat exceeded by the lightly woolly scapes; heads large, 3-5 cm. broad, deep yellow, the rays persistent and becoming white and membranous in age. Stony ridges and bluffs.

10. GAILLARDIA

Erect herbs with alternate leaves and large showy mostly long-peduncled flowers, yellow rays and yellow disk turning brownish, and the villous achenes with slender-awned pappus scales.

1. **Gaillardia aristata** Pursh (GREAT-FLOWERED GAILLARDIA). Somewhat hirsute, the hairs jointed; stems erect, 3-6 dm. high; leaves spatulate to lanceolate, entire, sinuate-dentate or even laciniate; heads 6-10 cm. broad; bracts of the involucre lanceolate, acuminate. Frequent on sandy plains and slopes.

11. STENOTUS

Densely caespitose perennials with woody base, narrow entire leaves, scapose stems, large heads of yellow flowers, campanulate involucre, alveolate receptacle, villous achenes with a pappus of white capillary bristles.

1. **Stenotus armerioides** Nutt. (NARROW-LEAVED STENOTUS). Glabrous; leaves rigid, crowded on the crowns, narrowly spatulate-linear, acute; stems about twice as long as the leaves, 2-3-leaved, naked-pedunculate above; bracts of the involucre oblong, obtuse, scarious margined. Dry naked banks and hills.

12. **ARNICA** (ARNICA)

Erect perennial herbs with mostly simple stems, opposite leaves, conspicuous long-peduncled heads of yellow flowers and linear pubescent achenes.

1. **Arnica cordifolia** Hook (HEART-LEAF ARNICA). Somewhat pubescent or villous, 1-3 dm. high; radical and lower stem leaves cordate-ovate, long-petioled; stem leaves 1-3 pair, the upper small, ovate or oblong and sessile; heads broad (4-7 cm.), solitary or additional paired ones from the uppermost axils; bracts of the involucre ovate to narrowly oblong, acuminate. Moist wooded slopes.

2. **Arnica fulgens** Pursh (SHINING ARNICA). Obscurely pubescent, erect, slender, 1-4 dm. high; leaves 3-6 pair, erect or ascending, 3-5-nerved, narrowly oblong, sometimes denticulate, tapering into a broad margined base; heads nearly as large as in the preceding, usually solitary, sometimes a pair from the uppermost axils; bracts of the involucre oblong. Moist open slopes and plains.

13. **SENECIO** (GROUNDSEL. SENECIO)

Herbs with alternate leaves, solitary or clustered heads of yellow flowers, cylindrical simple involucre of erect more or less united scales, and pappus of very numerous soft and slender white hairs. (See *Plant Relations*, p. 114, Fig. 114.)

* Leaves entire; heads few, medium size.

1. **Senecio perplexus** Aven Nelson (EARLY SENECIO). At first loosely floccose-woolly, soon becoming glabrate, stem erect, rather stout, 2.5-5 dm. high; leaves basal or below the middle (the uppermost being reduced to linear bracts), oblanceolate to oblong, tapering to a short margined petiole, margin sometimes denticulate or crisped; inflorescence a cymose-corymb of 8-15 heads; the central peduncles short, often over-topped by the lower; involucre bracts linear, black-tipped; rays 5-10; achene linear, as long or longer than the fine pappus. Frequent; moist open slopes.

2. **Senecio Purshianus** Nutt. (PURSH'S SENECIO). Permanently white-tomentose, mostly low and tufted, the several or numerous stems scapose-bracted above, 1-2 dm. high; leaves linear or narrowly oblanceolate; heads few, with few but conspicuous rays.

* * Leaves pinnately lobed, toothed or lacinate.

3. **Senecio Plattensis** Nutt. (PLATTE SENECIO). Floccose woolly, the stem somewhat permanently so; stem mostly simple and not tufted, 3-5 dm. high; basal leaves oblong, on slender petioles, serrate or somewhat lobed at base; stem-leaves longer, lanceolate or oblanceolate in outline, deeply lobed and the lobes dentate; heads several or numerous, in a rather open cymose-corymb; rays conspicuous. Frequent on Colorado plains.

4. **Senecio Nelsonii** Rydb. (NELSON'S SENECIO). Rather thinly tomentose, soon nearly glabrous, very densely tufted; the numerous stems erect, sparsely leafy, 1.5-4 dm. high; leaves crowded on the crowns, oblong to lanceolate in outline, sinuately toothed or lobed; inflorescence a sub-umbellate crowded cyme; heads 7-10 mm. high; achenes brown, glabrous and distinctly striate. Gravelly slopes and banks.

INDEX

Abronia, 20.
 Acer, 47.
 Aceraceæ, 47.
 Achillea, 85.
 Aconitum, 24.
 Agoseris, 82.
 Agrostemma, 21.
 Alder, 16.
 Alfalfa, 42.
 Alisma, 8.
 Alismaceæ, 7.
 Allium, 10.
 Alnus, 16.
 Alum Root, 33.
 Amelanchier, 39.
 American Cowslip, 60.
 American Dragon-head, 70.
 Androsace, 59.
 Anemone, 24.
 Anogra, 54.
 Apocynaceæ, 61.
 Apocynum, 61.
 Apple Family, 39.
 Aquilegia, 23.
 Aragallus, 45.
 Arctostaphylos, 58.
 Arenaria, 22.
 Argemone, 27.
 Argentina, 37.
 Arnica, 88.
 Arrow-head, 8.
 Asclepiadaceæ, 62.
 Asclepias, 62.
 Aspen, 15.
 Astragalus, 43.
 Atrogene, 25.
 Avens, 38.

 Balsamorhiza, 86.
 Balsam-root, 86.

Barberry, 27.
 Barberry Family, 27.
 Batrachium, 26.
 Bearberry, 58.
 Beard-tongue, 75.
 Beech Family, 16.
 Bellflower, 81.
 Berberidaceæ, 27.
 Berberis, 27.
 Betula, 15.
 Betulaceæ, 15.
 Bindweed, 63.
 Birch, 15.
 Birch Family, 15.
 Bitter Cress, 29.
 Bitter-root, 21.
 Bladder-pod, 30.
 Blueberry, 58.
 Borage Family, 66.
 Boraginaceæ, 66.
 Bramble, 36.
 Buckwheat Family, 18.
 Buffalo Berry, 52.
 Bunch-flower Family, 8.
 Bur-reed, 7.
 Bur-reed Family, 7.
 Bursa, 30.
 Buttercup, 25.

 Cactaceæ, 51.
 Cactus, 51.
 Cactus Family, 51.
 Calachortus, 10.
 Caltha, 23.
 Calypso, 13.
 Camass, 8.
 Campanula, 81.
 Campanulaceæ, 81.
 Campanula Family, 81.
 Caper Family, 31.

Capnoides, 27.
 Capparidaceæ, 31.
 Caprifoliaceæ, 78.
 Cardamine, 29.
 Carrot Family, 55.
 Caryophyllaceæ, 21.
 Castilleja, 77.
 Catchfly, 22.
 Cat-tail, 7.
 Cat-tail Family, 7.
 Celtis, 17.
 Cerastium, 22.
 Cercocarpus, 39.
 Cereus, 51.
 Chæenactis, 85.
 Chamænerion, 53.
 Cheiranthus, 31.
 Chickweed, 22.
 Chicory Family, 81.
 Chinaphila, 57.
 Choke-cherry, 40.
 Chylisma, 54.
 Cichoriaceæ, 81.
 Cinquefoil, 37.
 Clammy Weed, 31.
 Claytonia, 21.
 Clematis, 25.
 Cleome, 31.
 Clover, 42.
 Cockle, 21, 22.
 Collinsia, 76.
 Collomia, 65.
 Coltsfoot, 86.
 Columbine, 23.
 Columbo, 61.
 Comandra, 17.
 Commelinaceæ, 8.
 Compositæ, 83.
 Composite Family, 83.
 Cone-flower, 86.
 Convallariaceæ, 11.
 Convolvulaceæ, 62.
 Convolvulus, 63.
 Cornaceæ, 57.
 Cornel, 57.
 Cornus, 57.
 Corylus, 16.
 Cottonwood, 15.
 Cow Herb, 22.
 Cranberry Tree, 79.
 Crassulaceæ, 32.
 Cratægus, 39.

Crepis, 82.
 Cress, 29.
 Crowfoot Family, 23.
 Cruciferae, 28.
 Currant, 34.
 Cypripedium, 13.
 Cyrtorhyncha, 26.
 Dandelion, 82.
 Dasiphora, 36.
 Datura, 73.
 Delphinium, 24.
 Disporum, 12.
 Dock, 19.
 Dodecatheon, 60.
 Dogbane, 61.
 Dogbane Family, 61.
 Dog-tooth Violet, 10.
 Dogwood, 57.
 Dogwood Family, 57.
 Draba, 30.
 Dracocephalum, 70.
 Drupaceæ, 40.
 Drymocallis, 38.
 Echinocactus, 51.
 Echinocereus, 51.
 Edwina, 33.
 Elder, 79.
 Eleaginaceæ, 52.
 Elephantella, 78.
 Elm Family, 17.
 Enomegra, 27.
 Epilobium, 53.
 Ericaceæ, 58.
 Erigeron, 84.
 Eriogonum, 18.
 Erythronium, 10.
 Euphorbia, 46.
 Euphorbiaceæ, 46.
 Evening Primrose, 53, 54.
 Evening Primrose Family, 52.
 Evolvulus, 63.
 Fagaceæ, 16.
 False Hemlock-spruce, 6.
 False Mallow, 49.
 False Solomon's Seal, 11.
 Fendlera, 33.
 Figwort, 76.
 Figwort Family, 73.
 Flag, 12.

- Flax, 46.
 Flax Family, 46.
 Fleabane, 84.
 Four-o'clock Family, 20.
 Fragaria, 37.
 Frasera, 61.
 Fritillaria, 10.

 Gaillardia, 87.
 Galpinsia, 53.
 Gaura, 55.
 Gentian, 61.
 Gentiana, 61.
 Gentianaceæ, 60.
 Gentian Family, 60.
 Geraniaceæ, 46.
 Geranium, 46.
 Geranium Family, 46.
 Geum, 38.
 Gilia, 64.
 Glaux, 60.
 Glycyrrhiza, 43.
 Gooseberry, 34.
 Gooseberry Family, 34.
 Grape, 48.
 Grass of Parnassus, 33.
 Green Orchis, 13.
 Grossulariaceæ, 34.
 Ground cherry, 72.
 Groundsel, 88.
 Gyrostachys, 13.

 Hackberry, 17.
 Harboursia, 56.
 Hawksbeard, 82.
 Hazel-nut, 16.
 Heart-leaved Meadow Parsnip, 56.
 Heath Family, 58.
 Hedeoma, 70.
 Helianthus, 86.
 Heracleum, 57.
 Hesperaster, 50.
 Heuchera, 33.
 Hispid Poppy, 27.
 Holodiscus, 36.
 Honeysuckle, 80.
 Honeysuckle Family, 78.
 Hop, 17.
 Horse Mint, 70.
 Humulus, 17.
 Hydrophyllaceæ, 65.
 Hydrophyllum, 65.

 Indian Paint-brush, 77.
 Ipomœa, 62.
 Iridaceæ, 12.
 Iris, 12.
 Iris Family, 12.

 Jamesia, 33.
 Jimson-weed, 73.
 Juniper, 6.
 Juniperus, 6.

 Kinni-ki-nic, 58.
 Knotweed, 19.
 Kunzia, 36.

 Labiataæ, 69.
 Lactuca, 83.
 Lady-slipper, 13.
 Lady-tresses, 13.
 Lappula, 66.
 Larkspur, 24.
 Lathyrus, 45.
 Lavauxia, 54.
 Lepargyrea, 52.
 Lepidium, 29.
 Lesquerella, 30.
 Leucocrinum, 9.
 Lewisia, 21.
 Liliaceæ, 9.
 Lilium, 10.
 Lily, 10.
 Lily Family, 9.
 Lily-of-the-Valley Family, 11.
 Limnorchis, 13.
 Linaceæ, 46.
 Linnæa, 79.
 Linum, 46.
 Liquorice, 43.
 Lithospermum, 68.
 Loasaceæ, 50.
 Loasa Family, 50.
 Loco, 45.
 Lomatium, 56.
 Lonicera, 80.
 Loosestrife, 60.
 Lousewort, 77.
 Lucerne, 42.
 Lupine, 41.
 Lupinus, 41.

 Macrocalyx, 66.
 Mallow, 49.

Mallow Family, 48.
 Malva, 49.
 Malvaceæ, 48.
 Malvastrum, 49.
 Maple, 47.
 Maple Family, 47.
 Mariposa Lily, 10.
 Marsh Marigold, 23.
 Medicago, 42.
 Medick, 42.
 Melanthaceæ, 8.
 Melilotus, 42.
 Mentha, 70.
 Mentzelia, 50.
 Meriolix, 54.
 Mertensia, 67.
 Milk Vetch, 43.
 Milkweed, 62.
 Milkweed Family, 62.
 Mimulus, 76.
 Mint, 70.
 Mint Family, 69.
 Monarda, 70.
 Monkey-flower, 76.
 Monkshood, 24.
 Moraceæ, 17.
 Morning-glory, 62.
 Morning-glory Family, 62.
 Mountain Mustard, 29.
 Mountain Parsley, 56.
 Mulberry Family, 17.
 Mullein, 74.
 Musineon, 55.
 Mustard Family, 28.

 Nightshade, 72.
 Nightshade Family, 71.
 Nine-bark, 35.
 Nuttall's Buttercup, 26.
 Nyctaginaceæ, 20.
 Nyctelea, 66.

 Oak, 16.
 Oleaster Family, 52.
 Onagra, 53.
 Onagraceæ, 52.
 Onion, 10.
 Opulaster, 35.
 Opuntia, 51.
 Orchidaceæ, 12.
 Orchis Family, 12.
 Oreocarya, 67.

Orpine Family, 32.
 Orthocarpus, 77.
 Oxalidaceæ, 47.
 Oxalis, 47.
 Oxygraphis, 26.

 Pachylophus, 54.
 Papaveraceæ, 27.
 Papilionaceæ, 40.
 Parnassia, 33.
 Parsnip, 57.
 Parthenocissus, 48.
 Pasque Flower, 25.
 Pea, 45.
 Pedicularis, 77.
 Penny Cress, 29.
 Pennyroyal, 70.
 Pentstemon, 75.
 Pepper-grass, 29.
 Petalostemon, 42.
 Petasites, 86.
 Phacelia, 66.
 Phellopterus, 56.
 Phlox, 63.
 Physalis, 72.
 Physaria, 30.
 Physostegia, 71.
 Picea, 6.
 Pinaceæ, 5.
 Pine, 5.
 Pine Family, 5.
 Pink Family, 21.
 Pinus, 5.
 Pipsissewa, 57.
 Plantaginaceæ, 78.
 Plantago, 78.
 Plantain, 78.
 Plantain Family, 78.
 Plum, 40.
 Plum Family, 40.
 Polanisia, 31.
 Polemoniaceæ, 63.
 Polemonium, 65.
 Polemonium Family, 63.
 Polygonaceæ, 18.
 Polygonum, 19.
 Pomaceæ, 39.
 Poppy Family, 27.
 Populus, 15.
 Portulaca, 20.
 Portulacaceæ, 20.
 Potentilla, 37.

Prairie Clover, 42.
 Prickly Pear, 51.
 Primrose, 53, 54, 59.
 Primrose Family, 59.
 Primula, 59.
 Primulaceæ, 59.
 Prunella, 71.
 Prunus, 40.
 Pseudotsuga, 6.
 Puccoon, 68.
 Pulsatilla, 25.
 Pulse Family, 40.
 Purslane, 20.
 Purslane Family, 20.
 Pyrola, 58.
 Pyrolaceæ, 57.
 Pyrola Family, 57.

Quercus, 16.

Ranunculaceæ, 23.
 Ranunculus, 25.
 Ribes, 34.
 Rocky Mountain Bee-plant, 31.
 Roripa, 29.
 Rosa, 39.
 Rosaceæ, 35.
 Rose, 39.
 Rose Family, 35.
 Rubus, 36.
 Rudbeckia, 86.
 Rumex, 19.

Sagittaria, 8.
 Salicaceæ, 14.
 Salix, 14.
 Saltwort, 60.
 Sambucus, 79.
 Sandalwood Family, 17.
 Sand Flower, 20.
 Sandwort, 22.
 Santalaceæ, 17.
 Saxifraga, 32.
 Saxifragaceæ, 32.
 Saxifrage, 32.
 Saxifrage Family, 32.
 Scrophularia, 76.
 Scrophulariaceæ, 73.
 Scutellaria, 71.
 Seaside Crowfoot, 26.
 Sedum, 32.

Self-heal, 71.
 Senecio, 88.
 Service Berry, 39.
 Shepherd's Purse, 30.
 Shooting Star, 60.
 Shrubby Cinquefoil, 36.
 Sieversia, 38.
 Silene, 22.
 Silver Weed, 37.
 Sisymbrium, 29.
 Skullcap, 71.
 Smartweed, 19.
 Snowball, 20.
 Snowberry, 80.
 Solanaceæ, 71.
 Solanum, 72.
 Sorrel Family, 47.
 Spanish Bayonet, 11.
 Sparganiaceæ, 7.
 Sparganium, 7.
 Specularia, 81.
 Speedwell, 74.
 Spiderwort, 8.
 Spiderwort Family, 8.
 Spiny Poppy, 27.
 Spring Beauty, 21.
 Spruce, 6.
 Spurge, 46.
 Spurge Family, 46.
 Stachys, 71.
 Stanleya, 28.
 Steironema, 60.
 Stenotus, 87.
 Stickseed, 66.
 Strawberry, 37.
 Streptopus, 12.
 Sulphur Flower, 18.
 Sunflower, 86.
 Sweet Cicely, 56.
 Sweet Clover, 42.
 Symphoricarpos, 80.
 Synthyris, 74.

Taraxacum, 82.
 Tellima, 33.
 Tetraneuris, 87.
 Thlaspi, 29.
 Thermopsis, 41.
 Thorn, 39.
 Thorn-apple, 73.
 Townsendia, 84.
 Tradescantia, 8.

- | | |
|---------------------------|---------------------------|
| Trifolium, 42. | Virginia Creeper, 48. |
| Twin-flower, 79. | Vitaceæ, 48. |
| Typha, 7. | Vitis, 48. |
| Typhaceæ, 7. | |
| | Wall Flower, 31. |
| Ulmaceæ, 17. | Washingtonia, 56. |
| Umbelliferæ, 55. | Water-crowfoot, 26. |
| | Waterleaf, 65. |
| Vaccaria, 22. | Waterleaf Family, 65. |
| Vacciniaceæ, 58. | Water Plantain, 8. |
| Vaccinium, 58. | Water-plantain Family, 7. |
| Vagnera, 11. | Western Lion's Heart, 71. |
| Valeriana, 80. | Western Star, 50. |
| Valerianaceæ, 80. | White Mountain Lily, 9. |
| Valerian Family, 80. | Whitlow-grass, 30. |
| Venus' Looking-glass, 81. | Whortleberry Family, 58. |
| Verbascum, 74. | Wild Lettuce, 83. |
| Verbena, 68. | Willow, 14. |
| Verbenaceæ, 68. | Willow Family, 14. |
| Veronica, 74. | Willow Herb, 53. |
| Vervain, 68. | Wintergreen, 58. |
| Vervain Family, 68. | Woodbine, 48. |
| Vetch, 45. | Wood-sorrel, 47. |
| Viburnum, 79. | Woundwort, 71. |
| Vicia, 45. | |
| Vine Family, 48. | Yarrow, 85. |
| Viola, 49. | Yucca, 11. |
| Violaceæ, 49. | |
| Violet, 49. | Zizia, 56. |
| Virgin's Bower, 25. | Zygadenus, 8. |

(1)

THE END

TWENTIETH CENTURY TEXT-BOOKS.

The closing years of the nineteenth century witnessed a remarkable awakening of interest in American educational problems. There has been elaborate discussion in every part of our land on the co-ordination of studies, the balancing of contending elements in school programmes, the professional training of teachers, the proper age of pupils at different stages of study, the elimination of pedantic and lifeless methods of teaching, the improvement of text-books, uniformity of college-entrance requirements, and other questions of like character.

In order to meet the new demands of the country along these higher planes of educational work, the Twentieth Century Text-Books have been prepared.

At every step in the planning of the series care has been taken to secure the best educational advice, in order that the books may really meet the increasing demand from academies, high schools, and colleges for text-books that shall be pedagogically suitable for teachers and pupils, sound in modern scholarship, and adequate for college preparation.

The editors and the respective authors have been chosen with reference to their qualifications for the special work assigned to them. These qualifications are: First, that the author should have a thorough knowledge of his subject in its latest developments, especially in the light of recent educational discussions; second, that he should be able to determine the relative importance of the subjects to be treated in a text-book; third, that he should know how to present properly his topics to the ordinary student.

The general editorial supervision of the series is in the hands of Dr. A. F. Nightingale, formerly Superintendent of High Schools, Chicago, with whom is associated an advisory committee composed of an expert in each department of study.

The offer of a complete series of text-books for these higher grades of schools, issued under auspices so favorable, is an event worthy of the twentieth century, and a good omen for the educational welfare of the future.

One hundred volumes are comprised in the series. A list of those now ready, and of others in preparation, will be sent upon request.

D. APPLETON AND COMPANY, NEW YORK.

TWENTIETH CENTURY TEXT-BOOKS.

Botanical Works

By Professor J. M. COULTER, Head of Department of Botany, University of Chicago, and Others.

Plant Studies.

An Elementary Botany. 12mo. Cloth, \$1.25.

Plant Relations.

A First Book of Botany. 12mo. Cloth, \$1.10.

Plant Structures.

A Second Book of Botany. 12mo. Cloth, \$1.20.

Plants. A Text-Book of Botany. 12mo. Cloth, \$1.80.

Teachers' Manuals, free, accompany all these texts.

Analytical Keys to Flowering Plants.

12mo. Limp cloth.

Northern States. By Professor COULTER. 25 cents.

Pacific Slope. By Prof. W. L. JEPSON, University of California. 45 cents.

Rocky Mountain Regions. By Prof. AVEN NELSON, University of Wyoming. 45 cents.

A Laboratory Manual of Botany.

By OTIS W. CALDWELL, Ph. D., Eastern Illinois State Normal School. 12mo. Cloth, 50 cents.

Seed Plants. Part I. Morphology of Spermatophytes. By JOHN M. COULTER, Ph. D., University of Chicago, and CHARLES J. CHAMBERLAIN, Ph. D., Instructor in Botany in the same. Illustrated. 8vo. Cloth, \$1.75. 188 pages.

The Twentieth Century Botanical Course is now complete. It stands alone in its progressive pedagogical treatment of a great department of science. Its brilliant success in practical secondary school work has demonstrated the value of its principles and the attractiveness of their presentation.

D. APPLETON AND COMPANY, NEW YORK.

TWENTIETH CENTURY TEXT-BOOKS.

A Text-Book of Geology.

By Professor ALBERT PERRY BRIGHAM, of Colgate University. 477 Pages. 295 Illustrations. 12mo. Cloth, \$1.40.

This superb text-book is the best account for secondary schools of the earth's marvelous origin, of the processes that brought the ordered world out of chaos, and of the phenomena of geologic evolution—considered dynamically, structurally, and historically. The planet's life history is told with directness, brevity, and pedagogic fitness. The text is supplemented with 295 exquisite photographic illustrations, many taken by Professor Brigham for this work. An exceptional success in text-book writing and text-book making.

"Brigham's Geology is the cleanest cut and best pedagogical text-book for the high school that I have seen."—*C. H. Richardson, Hanover, N. H.*

"Most interesting. Decidedly the most practical book that I have seen for use in high schools."—*Miss S. A. Edwards, Philadelphia High School for Girls.*

I consider it the best written and best illustrated book I have ever seen for secondary schools."—*C. F. Warner, Mechanics Arts High School, Springfield, Mass.*

"The most attractive text-book of Geology for secondary schools that I have seen. The illustrations are a delight."—*Belle Sherman, Ithaca High School, Ithaca, N. Y.*

"It is magnificent. I consider it superior to any other book of the kind in illustrations, text, and adaptation to field work."—*Mrs. L. L. W. Wilson, Philadelphia Normal School.*

"In every way fully equal to any of the splendid series of Twentieth Century Text-Books. Many of the illustrations are new and their execution is perfect."—*R. I. Schiedt, Professor of Geology, Franklin and Marshall College, Lancaster, Pa.*

D. APPLETON AND COMPANY, NEW YORK.

TWENTIETH CENTURY ZOÖLOGY.

Animal Life.

A First Book of Zoölogy. By President DAVID STARR JORDAN and VERNON L. KELLOGG, M. S., Professor of Entomology in Leland Stanford Junior University. 12mo. Cloth, \$1.20.

"I believe it is an excellent thing, filling a gap that has long been apparent in our nature work in this country."—*Prof. Lawrence Bruner, University of Nebraska.*

"Your book is certainly an admirable discussion of biological problems up to date. It is interesting, and stimulative of thought and observation."—*Elliott R. Downing, University of Chicago.*

"The ecological treatment of zoölogy here finds a truly successful exhibition, and it is certainly very satisfactory and ahead of all previous attempts at a similar exposition for beginners in zoölogy."—*Prof. Julius Nelson, Rutgers College.*

"It is by far the best text-book on zoölogy yet published for the use of high-school students. It breathes the freshness of nature. Fortunate is the school that is permitted to use it."—*Principal W. N. Bush, Polytechnic High School, San Francisco, Cal.*

Animal Forms.

By President DAVID STARR JORDAN and HAROLD HEATH, Ph.D., Professor of Zoölogy in Leland Stanford Junior University. 12mo. Cloth, \$1.10.

"Animal Forms" deals similarly with animal morphology, structure and life processes, from the lowest, simplest, one-celled creations to the highest and most complex. The two complete a full year's work in zoölogy.

The first chapter defines zoölogy, and explains minutely the morphology of a typical animal. The second chapter discusses cells and protoplasm, and prepares the pupil for an intelligent and logical study of the general subject.

In simplicity of style, in correctness of scientific statement, in profuseness and perfectness of illustration, these books are without a peer. A Laboratory Manual is in preparation. Teachers' Manuals free.

D. APPLETON AND COMPANY, NEW YORK.

TWENTIETH CENTURY TEXT-BOOKS.

An Introduction to Physical Geography.

By GROVE KARL GILBERT, LL. D., United States Geological Survey; Author of "The Geology of the Henry Mountains," "Lake Bonneville," Numerous Reports, etc., in publications of United States Geological Survey; and ALBERT PERRY BRIGHAM, A. M., Professor of Geology, Colgate University, Hamilton, N. Y., Fellow of the Geological Society of America, etc., Associate Editor Bulletin American Geographical Society, Author of "A Text-Book of Geology" (Twentieth Century Text-Books). Illustrated. 12mo. Cloth.

SIX SALIENT POINTS.

The new pedagogy of Physical Geography receives in this book its first adequate presentation.

Hence, this text meets the present requirements of high school and college-entrance work perfectly and in full detail.

Treatment adapted to the early years of the course—the book will interest pupils aged fourteen.

Statements throughout are not merely theoretical, but definitely concrete, appropriately illustrated, and logically summarized.

Topics cover "The Physical Environment of Man:" The Earth as a Globe, the Ocean, the Air, and the Land—in increasing proportion.

The exquisite half-tone illustrations far surpass in beauty, helpfulness, and number anything before attempted. A most important and significant feature.

THE IDEAL COURSE AND GILBERT AND BRIGHAM'S BOOK.

This book meets fully, in minute detail, and for the first time, all the specifications set forth in the Report of the Committee on College Entrance Requirements to the National Educational Association in 1899. It keeps accurately to the definition laid down; it furnishes the requisite kind and amount of instruction to train the observation and to prepare for later special courses in science; and it elevates physical geography beyond cavil to the proper plane for a college-entrance requirement, by organizing its content to its highest capacity as a pedagogic discipline.

D. APPLETON AND COMPANY, NEW YORK.

TWENTIETH CENTURY TEXT-BOOKS.

COMMERCE AND INDUSTRY.

A Commercial Geography.

By CYRUS C. ADAMS, F. A. G. S., Editorial Staff of the *New York Sun*, formerly President Department of Geography, Brooklyn Institute. 12mo. 505 pages. Cloth, \$1.30.

A handbook for the student, the teacher, the scholar, and the business man. An extraordinary success in text-book making and text-book selling. Three large editions in two months after publication.

Characteristic features: Prepared expressly for educational purposes; topics indicated in heavy type to facilitate study; tables compiled from the latest data; 120 maps, 40 diagrams, 16 full-page half-tone illustrations; dry details not massed, but facts given in proper sequence; text not choked with statistics, but placed in full at end of chapters; prominence given to inventions and processes that facilitate production; basal principles of the geography of commerce stated, connecting effect with cause.

This text-book marks a new era in commercial education. Its signal success and the lavish praise it has brought from the leaders of the movement are sufficient testimonies to its merit. Adopted by high schools, normal schools, business schools, commercial colleges everywhere.

"The most scholarly as well as the most teachable book of the kind that I have seen."—*Arthur D. Arnold, Principal High School, Stoughton, Mass.*

"We have adopted Adams's Commercial Geography, and it is giving entire satisfaction."—*E. L. Brown, Principal North Side High School, Denver, Col.*

"I am greatly pleased with it. It furnishes just the information that is often very difficult, if not impossible, for a teacher to obtain. It can not fail to meet with success."—*F. E. Spaulding, City Superintendent of Schools, Passaic, N. J.*

D. APPLETON AND COMPANY, NEW YORK.

TWENTIETH CENTURY ENGLISH TEXTS.

LIST

Shakspeare's Macbeth.

Edited by RICHARD JONES, Ph. D., Vanderbilt University.
30 cents.

The Sir Roger de Coverley Papers.

Edited by FRANKLIN T. BAKER, A. M., Columbia University.
30 cents.

Macaulay's Essays on Milton and Addison.

Edited by GEORGE B. AITON, A. M., State Inspector of High Schools, Minnesota. 25 cents.

Selections from Milton's Shorter Poems.

Edited by FREDERIC D. NICHOLS, University of Chicago.
25 cents.

Dryden's Palamon and Arcite.

Edited by GEORGE M. MARSHALL, Ph. B., University of Utah.
25 cents.

George Eliot's Silas Marner.

Edited by J. ROSE COLBY, Ph. D., Illinois State Normal University, and RICHARD JONES, Ph. D. 30 cents.

Burke's Speech on Conciliation with America.

Edited by W. I. CRANE, Steele High School, Dayton, Ohio. 30 cts.

Coleridge's Rime of the Ancient Mariner.

By PELHAM EDGAR, B. A., Ph. D., Victoria College. 25 cents.

Shakspeare's The Merchant of Venice.

Edited by RICHARD JONES, Ph. D. 30 cents.

Tennyson's The Princess.

Edited by FRANKLIN T. BAKER, Columbia University. 25 cents.

Send for large circulars and sample pages of Twentieth Century Text-Books now ready.

D. APPLETON AND COMPANY, NEW YORK.

TWENTIETH CENTURY TEXT-BOOKS.

MODERN LANGUAGE SERIES.

Editors : H. A. TODD, Ph. D., Columbia University ;
H. S. WHITE, LL. D., Cornell University ; W. F. GIESE,
A. M., University of Wisconsin. Illustrated. 12mo. Cloth.

First Book in French.

By C. A. DOWNER, Ph. D., College of the City of
New York.

Les Forceurs de Blocus.

By JULES VERNE. Edited by C. Fontaine, L. D., De
Witt Clinton High School, New York. 30 cents.

Longer French Poems.

Edited by T. ATKINSON JENKINS, University of
Chicago.

Le Barbier de Séville.

By BEAUMARCHAIS. Edited by Antoine Muzzarelli,
New York.

Die Journalisten.

By FREYTAG. Edited by T. B. Bronson, A. M., Law-
renceville School. 45 cents.

Die Jungfrau von Orleans.

By SCHILLER. Edited by L. A. Rhoades, Ph. D.,
University of Illinois. 60 cents.

A German Reader.

By H. P. JONES, Ph. D., Hobart College. \$1.00.

Minna von Barnhelm.

By LESSING. Edited by C. B. Wilson, A. M., Uni-
versity of Iowa.

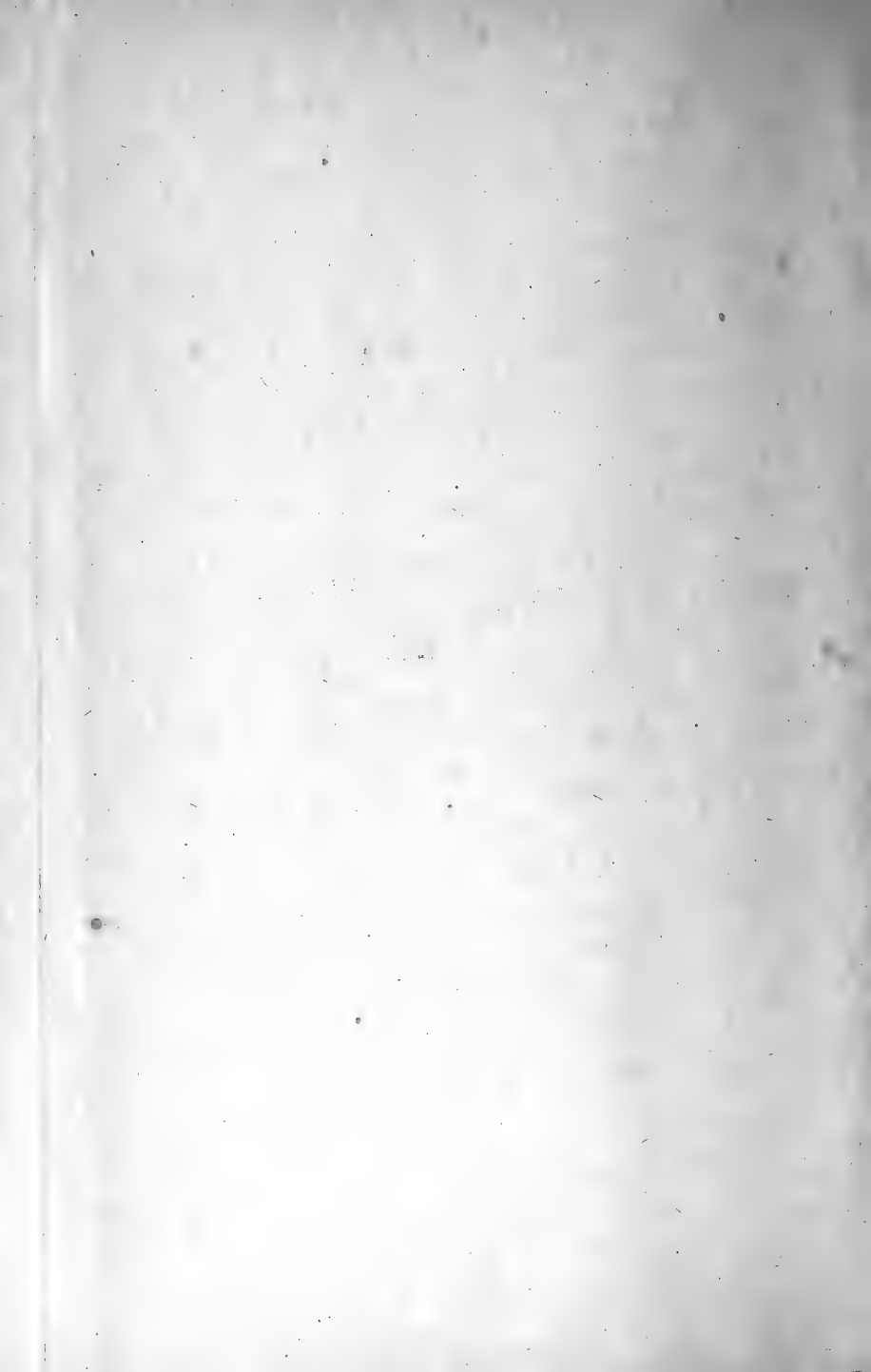
A First Book in Spanish.

By W. F. GIESE, A. M., University of Wisconsin.

SEND FOR CIRCULARS AND SAMPLE PAGES.

D. APPLETON AND COMPANY, NEW YORK.





JUN 19 1902

JUN. 18 1902

100.7 DEL. TO CAT. DIV.

JUN. 19 1902

JUN. 19 1902

JUN. 24 1902

LIBRARY OF CONGRESS



0 005 347 050 6